



Chemistry MSc

Vrije Universiteit Amsterdam - Faculteit der Exacte Wetenschappen - M Chemistry - 2014-2015

This programme is offered jointly with the Universiteit van Amsterdam (UvA).

Specializations

During the Master's in Chemistry, students can specialize themselves by doing a Major in one of the following disciplines:

- Analytical Sciences
- Molecular Design, Synthesis and Catalysis
- Molecular Simulation and Photonics

Variants

The Master's programme of Chemistry offers three different variants for graduation:

- Research variant (O - variant)
- Society-oriented variant (M - variant)
- Communication-education variant (C / E - variant)

The global composition of each variant is indicated below:

Variant	O	M	C	E
Compulsory courses (Major)	24-42*	18	18	18
Research project (Major)	42	36	36	36
Literature study and colloquium	12	6	6	6
Ethics and Portfolio academic skills	6	-	-	-
M, C or E programme	-	60	60	60
Optional programme, e.g. - deficiency courses - research project extension - scholarship (company, abroad) - advanced courses	18-36*	-	-	-
Total cp	120	120	120	120

Ad *) Depends on the specialization : Molecular Simulation & Photonics requires 30-42 EC compulsory courses with 18-30 EC optional programme, other specializations require 24 EC compulsory courses with 36 EC optional programme.

Students should arrange the composition of their Master's programme in consult with the Master's coordinator. The exam committee formally has to approve the composition and extent of the Master's programme.

[To master guidebook](#)

[To master co-ordinators](#)

Inhoudsopgave

Communication Variant	1
Optional courses for Communication Variant	1
Compulsory courses for Communication Variant	1
Education Variant	2
Leraar voorbereidend hoger onderwijs in Scheikunde verplicht	2
Chemistry courses for Education Variant	3
Research Variant Analytical Sciences	3
Compulsory Choice Ethics and Portfolio academic Skills	4
Deficiency Courses for HLO Bachelors	5
Research Project	5
Optional Courses	6
Compulsory Courses	7
Research Variant Molecular Design, Synthesis and Catalysis	7
Compulsory Choice Ethics and Portfolio academic Skills	8
Deficiency Courses for HLO Bachelors	9
Research Project	9
Optional Courses	10
Compulsory Courses	11
Research Variant Molecular Simulation & Photonics	12
Compulsory Choice Ethics and Portfolio academic Skills	12
Compulsory Optional Course Research project (Major) including report	13
Literature Thesis and Colloquium	13
Compulsory Optional Courses	14
Recommended Optional Courses Computational Chemistry	14
Compulsory Courses	15
Specialization Science, Business & Innovation	15
Compulsory Choice 1 out of 2	16
Compulsory Choice of 12 ec	16
Recommended optional Courses	17
Compulsory Courses	17
Specialization Science for Energy and Sustainability	17
Compulsory Choice of at least 24 ec.	18
Compulsory Choice Ethics and Portfolio Academic skills	18
Compulsory Choice Master Project	19
Compulsory Courses	19
Excellence Programme - Sustainability: the Molecular Approach	19
Optional Courses (choose 6 courses)	19
Compulsory Optional Courses (choose 3 of 7)	20
Literature Study and Research Proposal (12 EC)	21
Major research Project (42 ec)	21
Minor research project (choose 2)	21
Society Oriented Variant for Natural and Life Sciences	22
Optional Courses Social Variant	22

Compulsory Courses Social Variant	23
Vak: (Bio)Molecular Spectroscopy (Periode 5)	23
Vak: Ab Initio Molecular Dynamics (Periode 5)	24
Vak: Academic Practice Analytical Sciences (Ac. Jaar (september))	24
Vak: Advanced Experimental Techniques (Ac. Jaar (september))	25
Vak: Advanced Molecular Quantum Chemistry (Ac. Jaar (september))	25
Vak: Advanced Spectroscopy (Periode 6)	26
Vak: Algemene didactiek en Pedagogiek I (Periode 1+2, Periode 4+5)	27
Vak: Algemene Didactiek en Pedagogiek II (Periode 1+2, Periode 4+5)	28
Vak: Analysis of Governmental Policy (Periode 1)	29
Vak: Anorganische chemie 2 voor HLO (Periode 2)	31
Vak: Applied Theoretical Chemistry (Ac. Jaar (september))	32
Vak: Applied Theoretical Chemistry (Ac. Jaar (september))	33
Vak: Big Issues in Emergent Energy Materials (Periode 1)	34
Vak: Bio-analysis & Clinical Diagnostics (Periode 1)	34
Vak: Biomedical Modelling and Simulation (Periode 1)	35
Vak: Biomolecular Simulations (Periode 4)	36
Vak: Bio-Organic Chemistry (Periode 2)	37
Vak: BioSolar Cells (Periode 1)	38
Vak: Biosystems Data Analysis (Periode 3)	39
Vak: Business and Innovation in Life Science (Periode 3)	39
Vak: Business Management in Health and Life Sciences (Periode 2)	40
Vak: Business, Innovation and Value Creation in the Life Science Industry (Periode 3)	42
Vak: Capillary Electrophoresis (Periode 3)	43
Vak: Catalysis for sustainable energy (Periode 4)	44
Vak: Chemical Analysis for Forensic Evidence (Periode 2)	44
Vak: Chemical Biology (Periode 1)	45
Vak: Clinical development and clinical trials (Periode 3)	46
Vak: Colloquium and Literature Thesis (Ac. Jaar (september))	47
Vak: Colloquium and Literature Thesis (Ac. Jaar (september))	48
Vak: Colloquium and Literature Thesis (Ac. Jaar (september))	48
Vak: Colloquium and Literature Thesis (Ac. Jaar (september))	48
Vak: Communication, Organization and Management (Periode 2)	49
Vak: Coordination and Organometallic Chemistry (Periode 2)	50
Vak: Current Sustainable Energy Technologies (Periode 3)	50
Vak: Density Functional Theory for Chemists (Ac. Jaar (september))	51
Vak: Density Functional Theory for Chemists (Ac. Jaar (september))	52
Vak: Disability and Development (Periode 2)	53
Vak: Electrochemistry and Bioelectrochemistry (Periode 4+5+6)	55
Vak: English Academic Course (Periode 2+3, Periode 5+6)	55
Vak: Entrepreneurship in Health and Life Sciences (Periode 2)	55
Vak: Environmental Chemistry (Periode 1)	57
Vak: Ethics and Academic skills (Ac. Jaar (september))	57
Vak: Ethics and Academic skills (Ac. Jaar (september))	58
Vak: Ethics and Academic Skills (Ac. Jaar (september))	58

Vak: Ethics and Academic Skills (Ac. Jaar (september))	58
Vak: Ethics in Life Sciences (Periode 3)	59
Vak: Expertise and coördination in Knowledge Intensive Firms (Periode 1)	60
Vak: Fundamentals of Analytical Sciences (Periode 4)	61
Vak: Green Chemistry (Periode 1)	62
Vak: Health, Globalisation and Human Rights (Periode 2)	63
Vak: Heterogeneous Catalysis (Periode 3)	64
Vak: High-Throughput Screening (Periode 2)	64
Vak: Homogeneous Catalysis (Periode 5)	66
Vak: Innovation in Medical Technology to Improve the Health Care System (Periode 6)	66
Vak: Internship Biomolecular Analysis and Spectroscopy (Ac. Jaar (september))	67
Vak: Internship Biomolecular Analysis and Spectroscopy (Ac. Jaar (september))	67
Vak: Internship Biomolecular Analysis and Spectroscopy (Ac. Jaar (september))	68
Vak: Internship Communication Specialisation (Ac. Jaar (september))	68
Vak: Internship Organic Chemistry (Ac. Jaar (september))	70
Vak: Internship Organic Chemistry (Ac. Jaar (september))	71
Vak: Internship Organic Chemistry (Ac. Jaar (september))	71
Vak: Internship Societal Specialisation (Ac. Jaar (september))	72
Vak: Internship Theoretical Chemistry (Ac. Jaar (september))	72
Vak: Internship Theoretical Chemistry (Ac. Jaar (september))	73
Vak: Internship Theoretical Chemistry (Ac. Jaar (september))	73
Vak: Lasers and Quantum Optics (Periode 1)	73
Vak: Literature Study and Research Proposal Chemistry - AS - MSP (Ac. Jaar (september))	74
Vak: Literature Study and Research Proposal Chemistry, MDSC - AS (Ac. Jaar (september))	74
Vak: Literature Study and Research Proposal Chemistry, MDSC - MSP (Ac. Jaar (september))	75
Vak: Literature Thesis and Colloquium Chemistry - Organic Chemistry (Ac. Jaar (september))	75
Vak: Literature Thesis and Colloquium Chemistry - Physical Chemistry (Ac. Jaar (september))	76
Vak: Literature Thesis and Colloquium Chemistry - Theoretical Chemistry (Ac. Jaar (september))	76
Vak: Literature thesis and Colloquium Chemistry Molecular Simulation and Photonics (Ac. Jaar (september))	76
Vak: Literature Thesis SES (Ac. Jaar (september))	76
Vak: Major research Project Chemistry, AS - MSP (Ac. Jaar (september))	77
Vak: Major research Project Chemistry, MDSC - AS (Ac. Jaar (september))	77
Vak: Major research Project Chemistry, MDSC - MSP (Ac. Jaar (september))	77
Vak: Management of Sustainable Innovation (Periode 2)	78
Vak: Managing Science and Technology in Society (Periode 1)	79
Vak: Mass Spectrometry (Periode 2)	81
Vak: Master Project SfES (Ac. Jaar (september))	81
Vak: Master Project SfES (Ac. Jaar (september))	82
Vak: Master Project SfES (Ac. Jaar (september))	82
Vak: Master Project SfES (Ac. Jaar (september))	82
Vak: Master Project SfES (Ac. Jaar (september))	82
Vak: Master Research Project Biomol. Analysis and Spectr. (Ac. Jaar (september))	83
Vak: Master Research Project Biomol. Analysis and Spectr. ext (Ac. Jaar (september))	83
Vak: Master Research Project Biomol. Analysis and Spectr. ext (Ac. Jaar (september))	84

Vak: Master Research Project Biomol. Analysis and Spectr. ext (Ac. Jaar (september))	84
Vak: Master Research Project Chemistry - Education Variant (Ac. Jaar (september))	85
Vak: Master Research Project Chemistry - Molecular Simulation and Photonics (Ac. Jaar (september))	85
Vak: Master Research Project Chemistry - Organic Chemistry (Ac. Jaar (september))	85
Vak: Master Research Project Chemistry - Organic Chemistry - Extension (Ac. Jaar (september))	86
Vak: Master Research Project Chemistry - Organic Chemistry - Extension (Ac. Jaar (september))	86
Vak: Master Research Project Chemistry - Organic Chemistry - Extension (Ac. Jaar (september))	87
Vak: Master Research Project Chemistry - Society Oriented Variant (Ac. Jaar (september))	87
Vak: Master Research Project Chemistry Molecular Simulation and Photonics - Extension (Ac. Jaar (september))	87
Vak: Master Research Project Chemistry Molecular Simulation and Photonics - Extension (Ac. Jaar (september))	88
Vak: Master Research Project Chemistry Molecular Simulation and Photonics - Extension (Ac. Jaar (september))	88
Vak: Master Research Project Communication Variant (Ac. Jaar (september))	88
Vak: Minor research project Analytical Sciences (Ac. Jaar (september))	89
Vak: Minor Research Project Biomol. Analysis and Spectr. (Ac. Jaar (september))	89
Vak: Minor Research Project Biomol. Analysis and Spectr. (Ac. Jaar (september))	90
Vak: Minor Research Project Biomol. Analysis and Spectr. (Ac. Jaar (september))	90
Vak: Minor research project Design and Synthesis (Ac. Jaar (september))	91
Vak: Minor research project Molecular Simulation and Photonics (Ac. Jaar (september))	91
Vak: Minor Research Project Organic Chemistry (Ac. Jaar (september))	91
Vak: Minor Research Project Organic Chemistry (Ac. Jaar (september))	92
Vak: Minor Research Project Organic Chemistry (Ac. Jaar (september))	92
Vak: Minor Research Project Theoretical Chemistry (Ac. Jaar (september))	92
Vak: Minor Research Project Theoretical Chemistry (Ac. Jaar (september))	93
Vak: Minor Research Project Theoretical Chemistry (Ac. Jaar (september))	93
Vak: Modern Quantum Chemistry (Periode 4+5+6)	94
Vak: Molecular Computational Chemistry (Periode 5)	94
Vak: Molecular Photodynamics (Ac. Jaar (september))	95
Vak: Molecular Photodynamics (Ac. Jaar (september))	96
Vak: Networked Organizations and Communication (Periode 2)	97
Vak: Nuclear Magnetic Resonance (Periode 4)	98
Vak: Numerical Techniques (Periode 4+5)	98
Vak: Omics-procedures in molecular clinical Diagnostics (Periode 5)	99
Vak: Open Innovation in Science (Periode 2)	100
Vak: Organic Photovoltaics (Periode 2)	101
Vak: Organische Chemie voor HLO AS (Periode 1)	102
Vak: Organische chemie voor HLO-instroom (Periode 2)	102
Vak: Organometallic Chemistry and Homogenous Catalysis (Ac. Jaar (september))	103
Vak: Photosynthesis and Energy (Periode 5)	103
Vak: Physical-Organic Chemistry (Periode 1)	104
Vak: Policy, Politics and Participation (Periode 2)	105
Vak: Praktijk I (Periode 1+2+3, Periode 4+5+6)	106
Vak: Praktijk II (Periode 1+2+3, Periode 4+5+6)	107

Vak: Principles of Pharmaceutical Sciences / Pharmacochemistry (Periode 1)	108
Vak: Professionele ontwikkeling en onderzoek I (Periode 1+2+3, Periode 4+5+6)	109
Vak: Professionele ontwikkeling en onderzoek II (Periode 1+2+3, Periode 4+5+6)	110
Vak: Project Sustainable Future (Periode 6)	112
Vak: Protein Analysis (Periode 5)	113
Vak: Protein Science (Periode 1)	114
Vak: Qualitative and Quantitative Research Methods (Periode 1)	115
Vak: Quantum Theory of Molecules and Matter (Periode 1)	116
Vak: Relativistic Quantum Chemistry (Periode 4)	117
Vak: SBI Project & Master Thesis (Ac. Jaar (september))	118
Vak: Science and Communication (Periode 1)	119
Vak: Science and Society in a Hist. Persp. (Periode 5)	120
Vak: Science in Dialogue (Periode 2)	121
Vak: Science in Perspective (Periode 4+5)	123
Vak: Science Journalism (Periode 2)	123
Vak: Science Museology (Periode 3)	124
Vak: Science project (Ac. Jaar (september))	125
Vak: Scientific Computing and Programming (Periode 2)	127
Vak: Scientific Writing in English (Periode 2, Periode 6)	128
Vak: Separation Sciences (Periode 1)	130
Vak: Solid State NMR (Periode 1)	131
Vak: Statistical Theory of Complex Molecular Systems (Periode 1)	131
Vak: Structures & properties of organic molecules (Periode 1+2)	131
Vak: Supramolecular Chemistry and Nanomaterials (Periode 1)	132
Vak: Survival Guide for Scientists (Periode 6)	132
Vak: Synthetic Organic Chemistry (Periode 4)	132
Vak: Teaching Assistant (Ac. Jaar (september))	133
Vak: Teaching Assistant (Ac. Jaar (september))	133
Vak: Technology and Innovation Processes (Periode 2)	133
Vak: The analytical Chemist in Industry (Periode 5)	134
Vak: Thermodynamica (Periode 1, Periode 2+3)	135
Vak: Transdisciplinarity and Transition (Periode 2)	135
Vak: Transport Phenomena (Periode 4+5)	137
Vak: Tutoring Students (Periode 2)	138
Vak: Ultrafast Laser Physics (Periode 5)	139
Vak: Understanding Molecular Simulation (Periode 3)	140
Vak: Understanding Quantum Chemistry (Periode 2)	140
Vak: Vakdidactiek Scheikunde I (Periode 1+2, Periode 4+5)	141
Vak: Vakdidactiek Scheikunde II (Periode 1+2, Periode 4+5)	142
Vak: Verdieping (Periode 2+3, Periode 5+6)	143
Vak: Wetenschapscommunicatie voor Bèta-onderzoekers (Periode 5)	144
Vak: Wiskunde voor HLO-instroom (Periode 1+2)	145
Vak: Wiskunde voor HLO-instroom (Periode 2+3)	145

Communication Variant

This specialization is intended for students with a BSc degree in any of the bèta-studies who want to specialize in communication. The programme focuses on science communication theory, research and practice. The programme of the communication (C) specialization is 1 year (60 credits). This specialization may not be combined with the Societal specialization (M) or the Education specialization (E). C-courses are shared with master students from the Faculty of Earth and Life Sciences.

Programme

For a specialization degree it is required to spend 60 credits on Science Communication components. Two courses, one internship and a thesis are compulsory. The rest of the programme can be filled with optional courses. While science communication research is always a component of a students' internship, students have the opportunity to choose for placement at institutes such as newspapers, museums, science centers, companies, etc. to hone their practical as well as academic skills. Students' thesis comprise short (9 credits) literature studies on research questions about aspects of science communication.

To complete his or her entire Master programme (120 credits), the student has to choose 60 credits Chemistry courses.

Before formal enrolment, the students' programme has to be approved by the master coordinator as well as the programme coordinator for the Science Communication.

Opleidingsdelen:

- [Optional courses for Communication Variant](#)
- [Compulsory courses for Communication Variant](#)

Optional courses for Communication Variant

Vakken:

Naam	Periode	Credits	Code
Communication, Organization and Management	Periode 2	6.0	AM_470572
Science in Dialogue	Periode 2	6.0	AM_1002
Science Journalism	Periode 2	6.0	AM_471014
Science Museology	Periode 3	6.0	AM_470590

Compulsory courses for Communication Variant

In addition to the courses below a total of at least 18 EC of track specific courses has to be chosen in consultation with the master coordinator.

Vakken:

Naam	Periode	Credits	Code
Colloquium and Literature Thesis	Ac. Jaar (september)	6.0	X_432578
Internship Communication Specialisation	Ac. Jaar (september)	30.0	AM_471148
Master Research Project Communication Variant	Ac. Jaar (september)	36.0	X_432586
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582
Science and Communication	Periode 1	6.0	AM_470587

Education Variant

The teaching in these variant is mainly in Dutch. Therefore we also give the requirements in Dutch.

Programma

De opleiding voor het behalen van de eerstegraads lesbevoegdheid start twee keer per jaar, in september en in februari. De opleiding wordt aangeboden in twee semesters. Uitgaande van de start in september duurt semester 1 tot en met januari en semester 2 tot juli. De opleiding is sterk praktijkgericht. De helft van de opleiding bestaat uit praktijk door werkervaring of stage (ook wel schoolpracticum genoemd) op een school voor voortgezet onderwijs. Daarnaast kent de opleiding vier componenten: vakdidactiek, algemene didactiek/pedagogiek, praktijkonderzoek en verdiepingsmodulen.

Naast de educatievakken volgt de student 60 sp Chemistry vakken, in overleg met de mastercoördinator van de gekozen specialisatie. Hierbij zijn de twee vakken Literature thesis and Colloquium Chemistry Education Variant en Master Research Project Chemistry-Education Variant verplicht.

Studenten die bij de Communicatie variant de vakken 'interpersoonlijke communicatie' en 'museumologie en buitenschoolse educatie' volgen, krijgen bij de lerarenopleiding een vrijstelling voor verdiepingsmodulen, een deel van het praktijkonderzoek en een deel van algemene didactiek.

Opleidingsdelen:

- [Leraar voorbereidend hoger onderwijs in Scheikunde verplicht](#)
- [Chemistry courses for Education Variant](#)

Leraar voorbereidend hoger onderwijs in Scheikunde verplicht

Vakken:

Naam	Periode	Credits	Code
------	---------	---------	------

Algemene didactiek en Pedagogiek I	Periode 1+2, Periode 4+5	6.0	O_MLADEPI
Algemene Didactiek en Pedagogiek II	Periode 1+2, Periode 4+5	3.0	O_MLADEPII
Praktijk I	Periode 1+2+3, Periode 4+5+6	15.0	O_MLPRAKI
Praktijk II	Periode 1+2+3, Periode 4+5+6	15.0	O_MLPRAKII
Professionele ontwikkeling en onderzoek I	Periode 1+2+3, Periode 4+5+6	3.0	O_MLVPOOI
Professionele ontwikkeling en onderzoek II	Periode 1+2+3, Periode 4+5+6	6.0	O_MLVPOOII
Vakdidactiek Scheikunde I	Periode 1+2, Periode 4+5	3.0	O_MLVDSKI
Vakdidactiek Scheikunde II	Periode 1+2, Periode 4+5	6.0	O_MLVDSKII
Verdieping	Periode 2+3, Periode 5+6	3.0	O_MLVERD

Chemistry courses for Education Variant

In addition to the courses below a total of at least 18 EC of track specific courses has to be chosen in consultation with the master coordinator.

Vakken:

Naam	Periode	Credits	Code
Colloquium and Literature Thesis	Ac. Jaar (september)	6.0	X_432579
Master Research Project Chemistry - Education Variant	Ac. Jaar (september)	36.0	X_432587

Research Variant Analytical Sciences

The programme consists of 120 credits.

The research training takes place in one of the 4 research groups. Students must contact the Master coordinator at least two months before they would like to start their research training. The research training (Major) starts with a literature study and ends with a Master thesis, an oral presentation and a poster presentation. The research training (Minor) also starts with a literature study and ends with a written report and an oral presentation.

The program starts with an introductory course in which the basic concepts of analytical chemistry and the different areas where it is used, with their own specific problems, are discussed. Then separation techniques, spectroscopy and statistics will be taught at the master level. After these compulsory topics the program leaves a lot of freedom to go in detail into some of the advanced topics.

Research groups

The Master program Analytical Sciences is a unique combination of five strong analytical groups from the VU University Amsterdam (VU) and the University of Amsterdam (UvA). As these groups are complementary, a broad range of analytical topics is covered.

- Applied spectroscopy
- Bio-molecular Analysis
- Polymer analysis
- Biosystems Data Analysis
- Environmental analysis

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Master Coordinator:

Dr. H. Lingeman
K room O-357
T +31 (0) 20 598 7539
E h.lingeman@vu.nl

Opleidingsdelen:

- [Compulsory Choice Ethics and Portfolio academic Skills](#)
- [Deficiency Courses for HLO Bachelors](#)
- [Research Project](#)
- [Optional Courses](#)
- [Compulsory Courses](#)

Compulsory Choice Ethics and Portfolio academic Skills

Students need to select a total of 6 credits from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Business and Innovation in Life Science	Periode 3	3.0	X_432539
Business Management in Health and Life Sciences	Periode 2	6.0	AM_470584
Clinical development and clinical trials	Periode 3	6.0	AM_470585
Communication, Organization and Management	Periode 2	6.0	AM_470572
English Academic Course	Periode 2+3, Periode 5+6	3.0	X_437028
Entrepreneurship in Health and Life Sciences	Periode 2	6.0	AM_470575
Ethics and Academic skills	Ac. Jaar (september)	1.0	X_432725

Ethics and Academic skills	Ac. Jaar (september)	2.0	X_432726
Ethics and Academic Skills	Ac. Jaar (september)	6.0	X_437556
Ethics and Academic Skills	Ac. Jaar (september)	3.0	X_432517
Ethics in Life Sciences	Periode 3	3.0	AM_470707
Managing Science and Technology in Society	Periode 1	6.0	AM_470586
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582
Science and Communication	Periode 1	6.0	AM_470587
Science in Dialogue	Periode 2	6.0	AM_1002
Science in Perspective	Periode 4+5	6.0	X_437030
Science Journalism	Periode 2	6.0	AM_471014
Scientific Writing in English	Periode 2, Periode 6	3.0	X_400592
Survival Guide for Scientists	Periode 6	3.0	X_428523
Teaching Assistant	Ac. Jaar (september)	3.0	X_432741
Teaching Assistant	Ac. Jaar (september)	6.0	X_432742
Tutoring Students	Periode 2	3.0	X_432625
Wetenschapscommunicatie voor Bèta-onderzoekers	Periode 5	6.0	AB_470185

Deficiency Courses for HLO Bachelors

Keuze van 12 uit 18 in overleg met mastercoordinator (voor HLO bachelor Chemistry)

Vakken:

Naam	Periode	Credits	Code
Academic Practice Analytical Sciences	Ac. Jaar (september)	9.0	X_432843
Organische Chemie voor HLO AS	Periode 1	3.0	X_437587
Structures & properties of organic molecules	Periode 1+2	6.0	X_432842
Thermodynamica	Periode 1, Periode 2+3	6.0	X_430600
Wiskunde voor HLO-instroom	Periode 1+2	6.0	X_432806

Research Project

Compulsory choice of at least 42 credits. Optional extension of 6, 12 or 18 credits.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Master Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	42.0	X_432594
Master Research Project Biomol. Analysis and Spectr. ext	Ac. Jaar (september)	18.0	X_432595
Master Research Project Biomol. Analysis and Spectr. ext	Ac. Jaar (september)	12.0	X_432637
Master Research Project Biomol. Analysis and Spectr. ext	Ac. Jaar (september)	6.0	X_432680

Optional Courses

The subject options of 36, 30, 24 or 18 credits can be completed with the possibilities below.

Vakken:

Naam	Periode	Credits	Code
Advanced Spectroscopy	Periode 6	6.0	X_432767
Bio-analysis & Clinical Diagnostics	Periode 1	6.0	X_432765
Biosystems Data Analysis	Periode 3	6.0	X_437001
Capillary Electrophoresis	Periode 3	6.0	X_437002
Chemical Analysis for Forensic Evidence	Periode 2	6.0	X_437003
Environmental Chemistry	Periode 1	6.0	X_437004
High-Throughput Screening	Periode 2	6.0	X_435047
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	18.0	X_432523
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	24.0	X_432524
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	30.0	X_432525
Internship Organic Chemistry	Ac. Jaar (september)	18.0	X_432529
Internship Organic Chemistry	Ac. Jaar (september)	24.0	X_432530
Internship Organic Chemistry	Ac. Jaar (september)	30.0	X_432531
Internship Theoretical Chemistry	Ac. Jaar (september)	18.0	X_432532
Internship Theoretical Chemistry	Ac. Jaar (september)	24.0	X_432533

Internship Theoretical Chemistry	Ac. Jaar (september)	30.0	X_432534
Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	18.0	X_432649
Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	24.0	X_432650
Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	30.0	X_432651
Minor Research Project Organic Chemistry	Ac. Jaar (september)	18.0	X_432640
Minor Research Project Organic Chemistry	Ac. Jaar (september)	24.0	X_432641
Minor Research Project Organic Chemistry	Ac. Jaar (september)	30.0	X_432642
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	18.0	X_432646
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	24.0	X_432647
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	30.0	X_432648
Nuclear Magnetic Resonance	Periode 4	6.0	X_435667
Omics-procedures in molecular clinical Diagnostics	Periode 5	6.0	X_432766
Protein Analysis	Periode 5	6.0	X_435045
The analytical Chemist in Industry	Periode 5	6.0	X_437005

Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
(Bio)Molecular Spectroscopy	Periode 5	6.0	X_435062
Colloquium and Literature Thesis	Ac. Jaar (september)	12.0	X_432581
Fundamentals of Analytical Sciences	Periode 4	6.0	X_435059
Mass Spectrometry	Periode 2	6.0	X_435604
Separation Sciences	Periode 1	6.0	X_435609

Research Variant Molecular Design, Synthesis and Catalysis

The programme consists of 120 credits.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Master Coordinator:

Dr. J.C. Slootweg
K room KA-323a
T +31 (0) 20 598 7482
E jc.slootweg@few.vu.nl

Opleidingsdelen:

- [Compulsory Choice Ethics and Portfolio academic Skills](#)
- [Deficiency Courses for HLO Bachelors](#)
- [Research Project](#)
- [Optional Courses](#)
- [Compulsory Courses](#)

Compulsory Choice Ethics and Portfolio academic Skills

Students need to select a total of 6 credits from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Business and Innovation in Life Science	Periode 3	3.0	X_432539
Business Management in Health and Life Sciences	Periode 2	6.0	AM_470584
Clinical development and clinical trials	Periode 3	6.0	AM_470585
Communication, Organization and Management	Periode 2	6.0	AM_470572
English Academic Course	Periode 2+3, Periode 5+6	3.0	X_437028
Entrepreneurship in Health and Life Sciences	Periode 2	6.0	AM_470575
Ethics and Academic skills	Ac. Jaar (september)	1.0	X_432725
Ethics and Academic skills	Ac. Jaar (september)	2.0	X_432726
Ethics and Academic Skills	Ac. Jaar (september)	6.0	X_437556
Ethics and Academic Skills	Ac. Jaar (september)	3.0	X_432517
Ethics in Life Sciences	Periode 3	3.0	AM_470707
Managing Science and Technology in Society	Periode 1	6.0	AM_470586
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582

Science and Communication	Periode 1	6.0	AM_470587
Science in Dialogue	Periode 2	6.0	AM_1002
Science in Perspective	Periode 4+5	6.0	X_437030
Science Journalism	Periode 2	6.0	AM_471014
Scientific Writing in English	Periode 2, Periode 6	3.0	X_400592
Survival Guide for Scientists	Periode 6	3.0	X_428523
Teaching Assistant	Ac. Jaar (september)	3.0	X_432741
Teaching Assistant	Ac. Jaar (september)	6.0	X_432742
Tutoring Students	Periode 2	3.0	X_432625
Wetenschapscommunicatie voor Bèta-onderzoekers	Periode 5	6.0	AB_470185

Deficiency Courses for HLO Bachelors

Vakken:

Naam	Periode	Credits	Code
Anorganische chemie 2 voor HLO	Periode 2	3.0	X_430520
Organische chemie voor HLO-instroom	Periode 2	6.0	X_430519
Thermodynamica	Periode 1, Periode 2+3	6.0	X_430600
Wiskunde voor HLO-instroom	Periode 2+3	3.0	X_430560

Research Project

Compulsory choice of at least 42 credits. Optional extension of 6, 12 or 18 credits.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Master Research Project Chemistry - Organic Chemistry	Ac. Jaar (september)	42.0	X_432598
Master Research Project Chemistry - Organic Chemistry - Extension	Ac. Jaar (september)	6.0	X_432618
Master Research Project Chemistry - Organic Chemistry - Extension	Ac. Jaar (september)	18.0	X_432599

Master Research Project Chemistry - Organic Chemistry - Extension	Ac. Jaar (september)	12.0	X_432685
---	----------------------	------	----------

Optional Courses

The subject options of 36, 30, 24 or 18 credits can be completed with the possibilities below.

Optional courses also may be taken from the educational program offered by the Holland Research School of Molecular Chemistry (HRSMC). This Graduate School offers a number of inter-university courses and schools on yearly varying subjects. More detailed information can be found on the website <http://www.hrsmc.nl/education.html>.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Advanced Spectroscopy	Periode 6	6.0	X_432767
Bio-analysis & Clinical Diagnostics	Periode 1	6.0	X_432765
Biosystems Data Analysis	Periode 3	6.0	X_437001
Capillary Electrophoresis	Periode 3	6.0	X_437002
Chemical Analysis for Forensic Evidence	Periode 2	6.0	X_437003
Environmental Chemistry	Periode 1	6.0	X_437004
High-Throughput Screening	Periode 2	6.0	X_435047
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	18.0	X_432523
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	24.0	X_432524
Internship Biomolecular Analysis and Spectroscopy	Ac. Jaar (september)	30.0	X_432525
Internship Organic Chemistry	Ac. Jaar (september)	18.0	X_432529
Internship Organic Chemistry	Ac. Jaar (september)	24.0	X_432530
Internship Organic Chemistry	Ac. Jaar (september)	30.0	X_432531
Internship Theoretical Chemistry	Ac. Jaar (september)	18.0	X_432532
Internship Theoretical Chemistry	Ac. Jaar (september)	24.0	X_432533
Internship Theoretical Chemistry	Ac. Jaar (september)	30.0	X_432534

Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	18.0	X_432649
Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	24.0	X_432650
Minor Research Project Biomol. Analysis and Spectr.	Ac. Jaar (september)	30.0	X_432651
Minor Research Project Organic Chemistry	Ac. Jaar (september)	18.0	X_432640
Minor Research Project Organic Chemistry	Ac. Jaar (september)	24.0	X_432641
Minor Research Project Organic Chemistry	Ac. Jaar (september)	30.0	X_432642
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	18.0	X_432646
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	24.0	X_432647
Minor Research Project Theoretical Chemistry	Ac. Jaar (september)	30.0	X_432648
Omics-procedures in molecular clinical Diagnostics	Periode 5	6.0	X_432766
Organic Photovoltaics	Periode 2	6.0	X_422590
Protein Analysis	Periode 5	6.0	X_435045
The analytical Chemist in Industry	Periode 5	6.0	X_437005

Compulsory Courses

Compulsory Choice 4 out of 8: X_435663, X_435664, X_435665, X_435666, X_435667, X_435668, X_435669, X_435653

Vakken:

Naam	Periode	Credits	Code
Bio-Organic Chemistry	Periode 2	6.0	X_435669
Coordination and Organometallic Chemistry	Periode 2	6.0	X_435664
Homogeneous Catalysis	Periode 5	6.0	X_435668
Literature Thesis and Colloquium Chemistry - Organic Chemistry	Ac. Jaar (september)	12.0	X_432583
Molecular Computational Chemistry	Periode 5	6.0	X_435666
Nuclear Magnetic Resonance	Periode 4	6.0	X_435667
Physical-Organic Chemistry	Periode 1	6.0	X_435663

Supramolecular Chemistry and Nanomaterials	Periode 1	6.0	X_435653
Synthetic Organic Chemistry	Periode 4	6.0	X_435665

Research Variant Molecular Simulation & Photonics

The programme consists of 120 credits.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Master Coordinator:

Dr. Celia Fonseca Guerra
K room R-154
T +31 (0) 20 598 7627
E c.fonsecaguerra@vu.nl

Opleidingsdelen:

- [Compulsory Choice Ethics and Portfolio academic Skills](#)
- [Compulsory Optional Course Research project \(Major\) including report](#)
- [Literature Thesis and Colloquim](#)
- [Compulsory Optional Courses](#)
- [Recommended Optional Courses Computational Chemistry](#)
- [Compulsory Courses](#)

Compulsory Choice Ethics and Portfolio academic Skills

Students need to select a total of 6 credits from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Business and Innovation in Life Science	Periode 3	3.0	X_432539
Business Management in Health and Life Sciences	Periode 2	6.0	AM_470584
Clinical development and clinical trials	Periode 3	6.0	AM_470585
Communication, Organization and Management	Periode 2	6.0	AM_470572
English Academic Course	Periode 2+3, Periode 5+6	3.0	X_437028
Entrepreneurship in Health and Life Sciences	Periode 2	6.0	AM_470575
Ethics and Academic skills	Ac. Jaar (september)	1.0	X_432725
Ethics and Academic skills	Ac. Jaar (september)	2.0	X_432726

Ethics and Academic Skills	Ac. Jaar (september)	6.0	X_437556
Ethics and Academic Skills	Ac. Jaar (september)	3.0	X_432517
Ethics in Life Sciences	Periode 3	3.0	AM_470707
Managing Science and Technology in Society	Periode 1	6.0	AM_470586
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582
Science and Communication	Periode 1	6.0	AM_470587
Science in Dialogue	Periode 2	6.0	AM_1002
Science in Perspective	Periode 4+5	6.0	X_437030
Science Journalism	Periode 2	6.0	AM_471014
Scientific Writing in English	Periode 2, Periode 6	3.0	X_400592
Survival Guide for Scientists	Periode 6	3.0	X_428523
Teaching Assistant	Ac. Jaar (september)	3.0	X_432741
Teaching Assistant	Ac. Jaar (september)	6.0	X_432742
Tutoring Students	Periode 2	3.0	X_432625
Wetenschapscommunicatie voor Bèta-onderzoekers	Periode 5	6.0	AB_470185

Compulsory Optional Course Research project (Major) including report

Compulsory choice of at least 42 credits. Optional extension of 6, 12 or 18 credits.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Master Research Project Chemistry - Molecular Simulation and Photonics	Ac. Jaar (september)	42.0	X_432681
Master Research Project Chemistry Molecular Simulation and Photonics - Extension	Ac. Jaar (september)	6.0	X_432682
Master Research Project Chemistry Molecular Simulation and Photonics - Extension	Ac. Jaar (september)	12.0	X_432683
Master Research Project Chemistry Molecular Simulation and Photonics - Extension	Ac. Jaar (september)	18.0	X_432684

Literature Thesis and Colloquim

Students need to select a total of 12 credits or more from the following list.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Literature Thesis and Colloquium Chemistry - Physical Chemistry	Ac. Jaar (september)	12.0	X_432582
Literature Thesis and Colloquium Chemistry - Theoretical Chemistry	Ac. Jaar (september)	12.0	X_432584
Literature thesis and Colloquium Chemistry Molecular Simulation and Photonics	Ac. Jaar (september)	12.0	X_432679

Compulsory Optional Courses

Choose 2 of 3

Vakken:

Naam	Periode	Credits	Code
Advanced Experimental Techniques	Ac. Jaar (september)	6.0	X_432662
Ultrafast Laser Physics	Periode 5	6.0	X_422556
Understanding Molecular Simulation	Periode 3	6.0	X_432703
Understanding Quantum Chemistry	Periode 2	6.0	X_422557

Recommended Optional Courses Computational Chemistry

The subject options of 36, 30, 24 or 18 credits can be completed with courses in

- Computational Chemistry
- Physical Chemistry
- Physics of Light & Matter
- Physics of Life & Health.

Below the recommended courses in Computational Chemistry.

Note: Every programme, including the choice of optional courses, has to be discussed and agreed upon with the master coordinator or a personal mentor and approved by the Examination Board.

Vakken:

Naam	Periode	Credits	Code
Ab Initio Molecular Dynamics	Periode 5	6.0	X_435635
Advanced Molecular Quantum Chemistry	Ac. Jaar (september)	6.0	X_432663
Applied Theoretical Chemistry	Ac. Jaar (september)	12.0	X_432501
Applied Theoretical Chemistry	Ac. Jaar (september)	6.0	X_435612
Biomolecular Simulations	Periode 4	6.0	X_437019
Density Functional Theory for Chemists	Ac. Jaar (september)	6.0	X_435111
Density Functional Theory for Chemists	Ac. Jaar (september)	12.0	X_435112
Molecular Photodynamics	Ac. Jaar (september)	3.0	X_432701
Molecular Photodynamics	Ac. Jaar (september)	6.0	X_432702
Numerical Techniques	Periode 4+5	6.0	X_420082
Relativistic Quantum Chemistry	Periode 4	6.0	X_435113
Scientific Computing and Programming	Periode 2	6.0	X_435076
Supramolecular Chemistry and Nanomaterials	Periode 1	6.0	X_435653
Transport Phenomena	Periode 4+5	6.0	X_420075

Compulsory Courses

Students need to follow two courses in period 1 of year 1 and one course in period 1 of year 2.

Vakken:

Naam	Periode	Credits	Code
Lasers and Quantum Optics	Periode 1	6.0	X_422539
Quantum Theory of Molecules and Matter	Periode 1	6.0	X_428517
Statistical Theory of Complex Molecular Systems	Periode 1	6.0	X_428520

Specialization Science, Business & Innovation

The MSc-SBI program outlined below features two thematic lines: (1) life science, with an emphasis on drug development, molecular diagnostics and innovative medical instrumentation, and (2) energy science, with an emphasis on sustainable energy development. This program, combining the natural sciences with innovation skill sets from a business and

organizational perspective is spread across a two-year MSc-program. The program is full time and taught in English. To obtain an MSc degree in SBI, students must earn 120 credits (EC) in courses according to the scheme below.

1. Natural sciences 36 EC

a. Science courses 12 EC

b. Science project (incl literature research and research skills)
24 EC

2. Business and Social sciences 24 EC

3. Science, Business and Innovation 42 EC

a. SBI course 6 EC

b. SBI project (internship and master thesis) 36 EC

4. Complementary and/or electives 18 EC

In this program, students will be exposed to mandatory science classes, i.e. life science and/or energy science, to strengthen their background in natural sciences fundamentals. In addition, depending on the background of the students (either SBI BSc or other Bachelor degree) there will be possibilities to define an appropriate customized MSc program. The chosen core will be complemented with a science project (24 EC) for specialization in an area of interest, in either Life or Energy science and with 24 EC in social and business sciences. The courses in social and business sciences focus on the processes and organizational context of innovation trajectories in business, industry and on institutional settings of inventions in life science and energy science and sustainability. The MSc-SBI is finalized through a final SBI-project of 36 EC (usually an internship at a company or institute) integrating the science, business and social aspects, leading to a Master's Thesis.

Opleidingsdelen:

- [Compulsory Choice 1 out of 2](#)
- [Compulsory Choice of 12 ec](#)
- [Recommended optional Courses](#)
- [Compulsory Courses](#)

Compulsory Choice 1 out of 2

Vakken:

Naam	Periode	Credits	Code
Business, Innovation and Value Creation in the Life Science Industry	Periode 3	6.0	X_432723
Current Sustainable Energy Technologies	Periode 3	6.0	X_422582

Compulsory Choice of 12 ec

Compulsory Choice of 12 ects from 1 of the following Science courses:

Vakken:

Naam	Periode	Credits	Code
------	---------	---------	------

Biomedical Modelling and Simulation	Periode 1	6.0	X_430112
BioSolar Cells	Periode 1	6.0	X_428531
Chemical Biology	Periode 1	6.0	X_432538
Green Chemistry	Periode 1	6.0	X_430557
Innovation in Medical Technology to Improve the Health Care System	Periode 6	6.0	X_430602
Principles of Pharmaceutical Sciences / Pharmacochimistry	Periode 1	6.0	X_435675
Project Sustainable Future	Periode 6	6.0	X_432784
Protein Science	Periode 1	6.0	AM_470145

Recommended optional Courses

The choice of 18 ec should be filled with courses at masters level and has to be approved by the Examination Board

Vakken:

Naam	Periode	Credits	Code
Science and Society in a Hist. Persp.	Periode 5	6.0	X_400424
Technology and Innovation Processes	Periode 2	6.0	E_BA_TIP

Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Expertise and coördination in Knowledge Intensive Firms	Periode 1	6.0	X_432738
Management of Sustainable Innovation	Periode 2	6.0	X_432739
Networked Organizations and Communication	Periode 2	6.0	S_NOC
SBI Project & Master Thesis	Ac. Jaar (september)	36.0	X_432735
Science project	Ac. Jaar (september)	24.0	X_422591
Transdisciplinarity and Transition	Periode 2	6.0	X_430604

Specialization Science for Energy and Sustainability

Opleidingsdelen:

- Compulsory Choice of at least 24 ec.
- Compulsory Choice Ethics and Portfolio Academic skills
- Compulsory Choice Master Project
- Compulsory Courses

Compulsory Choice of at least 24 ec.

Vakken:

Naam	Periode	Credits	Code
Big Issues in Emergent Energy Materials	Periode 1	6.0	X_422587
BioSolar Cells	Periode 1	6.0	X_428531
Catalysis for sustainable energy	Periode 4	6.0	X_437027
Environmental Chemistry	Periode 1	6.0	X_437004
Green Chemistry	Periode 1	6.0	X_430557
Heterogeneous Catalysis	Periode 3	6.0	X_428013
Homogeneous Catalysis	Periode 5	6.0	X_435668
Management of Sustainable Innovation	Periode 2	6.0	X_432739
Open Innovation in Science	Periode 2	6.0	X_430583
Organic Photovoltaics	Periode 2	6.0	X_422590
Photosynthesis and Energy	Periode 5	6.0	X_422553

Compulsory Choice Ethics and Portfolio Academic skills

Compulsory choice of at least 6 ec

Vakken:

Naam	Periode	Credits	Code
Communication, Organization and Management	Periode 2	6.0	AM_470572
English Academic Course	Periode 2+3, Periode 5+6	3.0	X_437028
Managing Science and Technology in Society	Periode 1	6.0	AM_470586
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582
Science and Communication	Periode 1	6.0	AM_470587
Science in Dialogue	Periode 2	6.0	AM_1002
Science in Perspective	Periode 4+5	6.0	X_437030
Scientific Writing in English	Periode 2, Periode 6	3.0	X_400592

Survival Guide for Scientists	Periode 6	3.0	X_428523
Tutoring Students	Periode 2	3.0	X_432625
Wetenschapscommunicatie voor Bèta-onderzoekers	Periode 5	6.0	AB_470185

Compulsory Choice Master Project

Students need to select one of the courses from the following list. The sum of the Master project and Minor project must be at least 54 credits.

Vakken:

Naam	Periode	Credits	Code
Master Project SfES	Ac. Jaar (september)	30.0	X_422593
Master Project SfES	Ac. Jaar (september)	36.0	X_422594
Master Project SfES	Ac. Jaar (september)	42.0	X_422595
Master Project SfES	Ac. Jaar (september)	48.0	X_422596
Master Project SfES	Ac. Jaar (september)	54.0	X_422597

Compulsory Courses

Vakken:

Naam	Periode	Credits	Code
Current Sustainable Energy Technologies	Periode 3	6.0	X_422582
Literature Thesis SES	Ac. Jaar (september)	6.0	X_432785
Project Sustainable Future	Periode 6	6.0	X_432784

Excellence Programme - Sustainability: the Molecular Approach

Opleidingsdelen:

- [Optional Courses \(choose 6 courses\)](#)
- [Compulsory Optional Courses \(choose 3 of 7\)](#)
- [Literature Study and Research Proposal \(12 EC\)](#)
- [Major research Project \(42 ec\)](#)
- [Minor research project \(choose 2\)](#)

Optional Courses (choose 6 courses)

Vakken:

Naam	Periode	Credits	Code
------	---------	---------	------

(Bio)Molecular Spectroscopy	Periode 5	6.0	X_435062
Ab Initio Molecular Dynamics	Periode 5	6.0	X_435635
Advanced Molecular Quantum Chemistry	Ac. Jaar (september)	6.0	X_432663
Applied Theoretical Chemistry	Ac. Jaar (september)	6.0	X_435612
Bio-Organic Chemistry	Periode 2	6.0	X_435669
Density Functional Theory for Chemists	Ac. Jaar (september)	6.0	X_435111
Electrochemistry and Bioelectrochemistry	Periode 4+5+6	6.0	X_432798
Homogeneous Catalysis	Periode 5	6.0	X_435668
Mass Spectrometry	Periode 2	6.0	X_435604
Modern Quantum Chemistry	Periode 4+5+6	6.0	X_432807
Molecular Computational Chemistry	Periode 5	6.0	X_435666
Molecular Photodynamics	Ac. Jaar (september)	6.0	X_432702
Nuclear Magnetic Resonance	Periode 4	6.0	X_435667
Organometallic Chemistry and Homogenous Catalysis	Ac. Jaar (september)	6.0	X_432808
Physical-Organic Chemistry	Periode 1	6.0	X_435663
Quantum Theory of Molecules and Matter	Periode 1	6.0	X_428517
Relativistic Quantum Chemistry	Periode 4	6.0	X_435113
Scientific Computing and Programming	Periode 2	6.0	X_435076
Solid State NMR	Periode 1	6.0	X_432809
Statistical Theory of Complex Molecular Systems	Periode 1	6.0	X_428520
Supramolecular Chemistry and Nanomaterials	Periode 1	6.0	X_435653
Synthetic Organic Chemistry	Periode 4	6.0	X_435665
Understanding Quantum Chemistry	Periode 2	6.0	X_422557

Compulsory Optional Courses (choose 3 of 7)

Vakken:

Naam	Periode	Credits	Code
(Bio)Molecular Spectroscopy	Periode 5	6.0	X_435062
Homogeneous Catalysis	Periode 5	6.0	X_435668

Molecular Computational Chemistry	Periode 5	6.0	X_435666
Physical-Organic Chemistry	Periode 1	6.0	X_435663
Quantum Theory of Molecules and Matter	Periode 1	6.0	X_428517
Statistical Theory of Complex Molecular Systems	Periode 1	6.0	X_428520
Synthetic Organic Chemistry	Periode 4	6.0	X_435665

Literature Study and Research Proposal (12 EC)

Vakken:

Naam	Periode	Credits	Code
Literature Study and Research Proposal Chemistry - AS - MSP	Ac. Jaar (september)	12.0	X_432800
Literature Study and Research Proposal Chemistry, MDSC - AS	Ac. Jaar (september)	12.0	X_432801
Literature Study and Research Proposal Chemistry, MDSC - MSP	Ac. Jaar (september)	12.0	X_432802

Major research Project (42 ec)

Vakken:

Naam	Periode	Credits	Code
Major research Project Chemistry, AS - MSP	Ac. Jaar (september)	42.0	X_432803
Major research Project Chemistry, MDSC - AS	Ac. Jaar (september)	42.0	X_432804
Major research Project Chemistry, MDSC - MSP	Ac. Jaar (september)	42.0	X_432805

Minor research project (choose 2)

Vakken:

Naam	Periode	Credits	Code
Minor research project Analytical Sciences	Ac. Jaar (september)	6.0	X_437031
Minor research project Design and Synthesis	Ac. Jaar (september)	6.0	X_437033

Minor research project Molecular Simulation and Photonics	Ac. Jaar (september)	6.0	X_437035
---	----------------------	-----	----------

Society Oriented Variant for Natural and Life Sciences

Due to the growing complexity of technological and medical issues and the interaction with society, organisations working in this sector have a growing and urgent need for academic professionals in the natural and life sciences, who have knowledge of policy management and entrepreneurship. The Society oriented variant offers students with a bachelor degree in the natural and life sciences the chance to combine a specialization in this field with a specialization in research.

Programme

The programme of the Society oriented variant is equal to the first year of the master programme Management Policy- Analysis and entrepreneurship (MPA). The programme of the Society oriented variant consists of 60 cp (18 cp compulsory courses; 12 cp optional courses and 30 cp internship) The course language is English, unless all students participating in the course speak Dutch, the course language will be Dutch.

Apart from the communication courses, the student has to choose 60 sp Chemistry courses. The student has to discuss the programme with the master coordinator of the chosen specialisation.

Opleidingsdelen:

- [Optional Courses Social Variant](#)
- [Compulsory Courses Social Variant](#)

Optional Courses Social Variant

Compulsory choice of 18 credits

Vakken:

Naam	Periode	Credits	Code
Business Management in Health and Life Sciences	Periode 2	6.0	AM_470584
Clinical development and clinical trials	Periode 3	6.0	AM_470585
Disability and Development	Periode 2	6.0	AM_470588
Entrepreneurship in Health and Life Sciences	Periode 2	6.0	AM_470575
Health, Globalisation and Human Rights	Periode 2	6.0	AM_470818
Policy, Politics and Participation	Periode 2	6.0	AM_470589
Qualitative and Quantitative Research Methods	Periode 1	6.0	AM_470582
Science Museology	Periode 3	6.0	AM_470590

Compulsory Courses Social Variant

In addition to the courses below a total of at least 18 EC of track specific courses has to be chosen in consultation with the master coordinator.

Vakken:

Naam	Periode	Credits	Code
Analysis of Governmental Policy	Periode 1	6.0	AM_470571
Colloquium and Literature Thesis	Ac. Jaar (september)	6.0	X_432580
Communication, Organization and Management	Periode 2	6.0	AM_470572
Internship Societal Specialisation	Ac. Jaar (september)	30.0	AM_471147
Master Research Project Chemistry - Society Oriented Variant	Ac. Jaar (september)	36.0	X_432588

(Bio)Molecular Spectroscopy

Vakcode	X_435062 (435062)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. G.W. Somsen
Examinator	prof. dr. G.W. Somsen
Docent(en)	prof. dr. G.W. Somsen
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

This course deals with interactions between light and molecules as studied and employed by optical spectroscopy. Goal of the course is to acquire a deeper knowledge of several spectroscopic principles and techniques frequently applied in (bio)analytical chemistry.

Inhoud vak

The course will start with an introduction to photophysical principles and fundamentals of molecular spectroscopy. Basic aspects of molecular orbitals, electronic transitions and quantummechanics will be treated. Basic properties of light and principal optical instrumentation will be discussed. The fundamentals, practice and applications of electronic spectroscopy (UV/Vis absorption, fluorescence, phosphorescence) and vibrational spectroscopy (infrared, Raman) will be systematically treated.

Onderwijsvorm

Lectures and problem solving sessions.

Toetsvorm

Written examination.

Literatuur

Lectures and problem solving sessions.

Vereiste voorkennis

Basic knowlegde on chemical structure, bonds and hybridization.

Aanbevolen voorkennis

Basic principles of molecular orbitals, energy levels and molecular vibrations. Basic experience with absorption spectrometry.

Doelgroep

mCh-AS

Ab Initio Molecular Dynamics

Vakcode	X_435635 (435635)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	500

Inhoud vak

The course description is available on:

<http://studiegids.uva.nl/web/uva/sgs/en/c/215.html>

Doelgroep

mCh-MSP

Overige informatie

Opgave via <https://www.sis.uva.nl> tot 4 weken voor aanvang van het semester is verplicht

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Academic Practice Analytical Sciences

Vakcode	X_432843 ()
Periode	Ac. Jaar (september)
Credits	9.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	400

Advanced Experimental Techniques

Vakcode	X_432662 (432662)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Docent(en)	prof. dr. M.H.M. Janssen
Lesmethode(n)	Hoorcollege, Practicum
Niveau	500

Doel vak

To provide a broad overview of advanced experimental techniques, equipment and measurement concepts, and their application in modern research in the physical and life sciences.

Inhoud vak

This course covers both the principles and the building blocks of experimental measurement techniques and their applications in physics, chemistry and life sciences. We will discuss the basics and state-of-the-art implementations of vacuum technology, optical and wavelength dispersing components, electronics and measurement devices, photon and particle detectors, charged particle optics and imaging. This is integrated with measurement and experimental concepts like molecular beams, ionization and fluorescence spectroscopy, sub-Doppler and Cavity-Ring-Down spectroscopy, multidimensional spectroscopy, coincidence electron and ion imaging, and microscopy. Applications of these advanced measurement techniques in studies of atomic, molecular and (bio)material in physical and life sciences will be reviewed using recent Review Papers.

Onderwijsvorm

A combination of lectures, exercises and assignments, demonstrations; in total 42 hours.

Toetsvorm

To be decided.

Literatuur

Moore, J.H., Davis, C.C., and Coplan, M.A. Building Scientific Apparatus 4th ed. Cambridge University Press, 2009.

Review articles.

Doelgroep

mCH

Advanced Molecular Quantum Chemistry

Vakcode	X_432663 (432663)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels

Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. L. Visscher
Examinator	prof. dr. L. Visscher
Niveau	500

Doel vak

Introduce the theoretical framework used in molecular quantum chemistry at a level that allows the student to actively participate in ongoing research.

Inhoud vak

The course builds on the course Understanding Quantum Chemistry by providing a more detailed discussion of modern electron structure methods (in particular second quantization, orbital optimization, basis set techniques and efficient integral evaluation) and their applications.

Onderwijsvorm

Self study and discussion groups (depending on the number of student who participate).

Toetsvorm

Written exam.

Literatuur

Molecular Electronic Structure Theory. Helgaker, Jørgensen, Olsen. Wiley. ISBN-13: 978-0470017609.

Aanbevolen voorkennis

Master course Understanding Quantum Chemistry

Doelgroep

MSc. Chemistry

Overige informatie

Period 5: schedule in consultation with the lecturer.

Advanced Spectroscopy

Vakcode	X_432767 ()
Periode	Periode 6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. F. Ariese
Examinator	dr. F. Ariese
Docent(en)	dr. F. Ariese
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

To acquire a deeper insight into the basic principles and modern developments of molecular spectroscopy in (bio)analytical chemistry,

with emphasis on fluorescence/luminescence and Raman techniques.
To become familiar with recent literature on the use of these techniques in a variety of applications.
To acquire practical skills in modern (laser) spectroscopy.

Inhoud vak

The topics discussed comprise the basic principles of fluorescence/phosphorescence and Raman spectroscopy. Attention will be given to energy transfer mechanisms and the use of fluorescent probes, high-resolution fluorescence at cryogenic temperatures, single-molecule spectroscopy and coupling to analytical separation techniques. Raman spectroscopic topics will include surface-enhanced Raman, resonance Raman, time-resolved Raman and non-linear Raman techniques. Instrumental aspects, such as laser excitation, time-resolved detection, polarization and imaging will also be covered in this course. Recent examples of the use of these techniques in a chemistry, medical, environmental, industrial, forensic or space research context will be discussed on the basis of literature presentations by the students. The course also includes a set of fluorescence and Raman experiments at VU LaserLaB

Onderwijsvorm

Lectures, tutorials

In small groups the students will carry out a set of experiments, of which the results will be laid down in a report and an oral presentation.

The students will also prepare a presentation on a recent literature article, to be given and discussed in class.

Toetsvorm

The final grade will be determined based on

Experiment report (1/6)

Experiment presentation (1/6)

Literature presentation (1/6)

Written exam (3/6)

Literatuur

Handouts and literature articles will be provided by the lecturer

Aanbevolen voorkennis

Background knowledge of molecular spectroscopic techniques, in particular fluorescence and Raman, is expected (for instance MSc Chem course (bio)molecular spectroscopy or 3MNV/2N course Microscopy and Spectroscopy). When in doubt please contact the lecturer.

Doelgroep

MSc Chemistry, MSc Medical Natural Sciences

Algemene didactiek en Pedagogiek I

Vakcode	O_MLADEPI ()
Periode	Periode 1+2, Periode 4+5
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek

Docent(en)	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, drs. W. Jongejan, dr. H.B. Westbroek, dr. E. van den Berg, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. J.J.M. van Eersel, drs. K.L. Schaap, W. Maas, drs. G.D. van Hummel, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

De student kan algemene onderwijskundige en pedagogische inzichten op het terrein van (activerende) didactiek (rol van ontwerper), communicatie in de klas (rol van uitvoerder) en gedrag- en leerproblemen (verdiepende module) vertalen naar de eigen lespraktijk.

Inhoud vak

Deze module kent 4 onderdelen:

- de startweek (1 erts), waarin de student kennis maakt met de opleiding, met het basisinstrumentarium van een docent en de eigen startcompetenties in kaart brengt;
- colleges ten aanzien van de rol van Ontwerper en de rol van Uitvoerder;
- colleges over gedrag- en leerproblemen, waarin problematiek en aanpak van meest gangbare gedrag- en leerproblemen aan bod komen.

Onderwijsvorm

Colleges (hoorcolleges en werkgroepen)

Toetsvorm

- beoordeling van het portfolio
- tentamen over de colleges gedrag- en leerproblemen

Literatuur

Een literatuurlijst wordt verstrekt aan het begin van de opleiding

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding

Overige informatie

Voor alle onderdelen (startweek, rollen, verdiepende module) geldt een aanwezigheidsplicht

Algemene Didactiek en Pedagogiek II

Vakcode	O_MLADEPII ()
Periode	Periode 1+2, Periode 4+5
Credits	3.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek

Docent(en)	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. B. Klein, dr. T. Bosma, dr. H.B. Westbroek, dr. E. van den Berg, C.L. Geraedts, drs. A. Krijgsman, dr. A.A. Kaal, dr. J.J.M. van Eersel, drs. K.L. Schaap, W. Maas, drs. G.D. van Hummel, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Doel vak

De student kan:

1. leerlingen, als individu en als lid van de groep, ondersteunen en stimuleren in hun verdere persoons- en identiteitsontwikkeling;
2. de voorbeeldfunctie ten opzichte van leerlingen vormgeven en daarop reflecteren;
3. leerlingen helpen bij de voorbereiding op hun rol in de samenleving als actief participierend burger;
4. deze en eerdere verworven competenties aantonen in een showcaseportfolio

Inhoud vak

Deze module kent 2 onderdelen:

- colleges ten aanzien van de rol van Pedagoog;
- het werken aan de rolopdachten voor de rol van uitvoerder, ontwerper en pedagoog voor het showcaseportfolio;

Onderwijsvorm

Colleges (hoorcolleges en werkgroepen) en zelfstudie

Toetsvorm

- een tentamen betreffende de rol van Pedagoog
- beoordeling van het showcase portfolio, waarin de student de verworven competenties ten aanzien van alle rollen aantoont

Literatuur

Een literatuurlijst wordt verstrekt aan het begin van de opleiding, en staat op Blackboard bij de betreffende studieonderdeel

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding

Overige informatie

Voor de colleges geldt een aanwezigheidsplicht. Studenten die dit vooraf met de vakdidacticus/mentor overeengekomen zijn, kunnen in zelfstudie onderdelen afronden.

Analysis of Governmental Policy

Vakcode	AM_470571 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels

Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	drs. R.M. Edelenbosch MA
Examinator	prof. dr. J.T. de Cock Buning
Docent(en)	prof. dr. J.T. de Cock Buning
Lesmethode(n)	Hoorcollege, Werkgroep, Computerpracticum
Niveau	500

Doel vak

- To acquire critical knowledge regarding different policy models and theories
- To master the correct use of central concepts in political and policy discourses.
- To further deepen your analytic skills with respect to the critical assessment of a complex societal question or dilemma in the health and life science;
- To learn to integrate science- specific knowledge with the knowledge and skills of other disciplines of the social sciences
- To practice skills in data collection and analysis
- To learn to set up valid lines of argumentation;
- To learn to translate research findings into policy recommendations;
- To get experienced in writing a policy advisory report;
- To improve your communication skills;
- To improve your skills in working effectively in a project team, through team building, team analysis and feedback.

Inhoud vak

Governmental policy affects millions of people and is thus object of intensive debate and target of strong societal forces, like political parties, media and interest groups. Being an advisor or policy maker requires a thorough understanding of the dynamics of policy making, as well as from the psychological side as from the more social structures and their influence on a deliberative democracy.

The course contains several lectures on theoretical concepts and models concerning policy analysis. Furthermore you will be challenged, under supervision, to apply and practice these concepts and models in the project assignment. From the very first day, you will be part of a project team of about ten students. You are confronted with a real policy problem from an external commissioning institution (e. g. a non-governmental organization, a Ministry, an advisory council). Within those 4 weeks you will collect data by literature review and interviews and conduct an interdisciplinary analysis on the basis of which you provide an advice. Specific attention is paid to working in a project team and team building. At the end of the course, you prepare an advisory report. On the last day of the course you present the report to the representative of the external institution who commissioned the project. In that presentation your team will highlight the main results of your analysis and defend the recommendations you propose.

Onderwijsvorm

Analysis of Governmental Policy is a fulltime course of four weeks (6 ECTS). The most recent course schedule is to be found on Blackboard. The total study time is 160 hours. Tuition methods include lectures, training workshops, and self-study.

The different elements have the following study time:

- lectures: 15 hours
- project: 147 hours (within the project: 18x 1 hour coach meeting)

- self study: (within the project, defined in the group)
- examination: 2 hours

Please note that attendance to the project meetings is compulsory. Attendance to the lectures is highly recommended. In our experience, relying on self-study alone is insufficient to pass the exam

Toetsvorm

Written exam (25%) and individual evaluation based on personal performance in the project team (50%), and assessment of various group products (report and presentation (25%)). Exam has to be passed successfully.

Literatuur

Buse, Mays and Walt: "Making Health Policy" McGrawHill/Open University press. (at least 2nd edition 2012).

Aanbevolen voorkennis

The project integrates the learned lessons from the first compulsory MPA courses: Qualitative & Quantitative Methods.\

Doelgroep

Compulsory course within the Masterprogramme Management, Policy Analysis and entrepreneurship for the health and life sciences (MPA) and the Societal differentiation of Health, Life and Natural Sciences Masters programmes.

Overige informatie

The case is policy analysis and advice, but the exercised methods and skills are equally applicable to strategic marketing advice or evaluation studies. The teams will be coached by workgroup leaders.

Anorganische chemie 2 voor HLO

Vakcode	X_430520 (430520)
Periode	Periode 2
Credits	3.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. A.W. Ehlers
Examinator	dr. A.W. Ehlers
Docent(en)	dr. A.W. Ehlers
Lesmethode(n)	Werkcollege
Niveau	400

Doel vak

Het doel van dit college is het verder uitbreiden van de basiskennis op het gebied van de anorganische chemie, in het bijzonder m.b.t. de coördinatiechemie en de organometaalchemie.

Inhoud vak

In het college wordt aandacht besteed aan de volgende onderwerpen:

- coördinatiechemie (structuur en assymetrie van overgangsmetaalcomplexen, binding en electronenstructuur, magnetisme,

Jahn-Teller verstoring, reacties van coördinatieverbindingen);
- organometaalchemie (18-electronenregel, carbonylcomplexen,
Dewar-Chat model, metaal-metaalbinding);

Onderwijsvorm

Colleges (hoorcollege, werkcolleges), Zelfstudie.

Toetsvorm

Schriftelijk tentamen. Tot de tentamenstof behoort alle op het college behandelde stof, alsmede de genoemde delen van het studieboek. Herkansing mogelijk mondeling.

Literatuur

Atkins, P. e.a., Shriver & Atkins: Inorganic Chemistry 4th ed. Oxford: Oxford University Press, 2006. i.h.b. hfdst. 7, 8, 18-21, 25..st. 9-16.

Aanvullend materiaal is online beschikbaar via Blackboard.

Doelgroep

HLO-instroom

Overige informatie

Student schrijft zich in voor Anorganische Chemie voor HLO-instroom (X_430520), en volgt het theoretisch gedeelte van Anorganische Chemie (X_430514).

Cijfer komt te staan bij Anorganische Chemie voor HLO-instroom (X_430520).

Applied Theoretical Chemistry

Vakcode	X_432501 (432501)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. F.M. Bickelhaupt
Examinator	prof. dr. F.M. Bickelhaupt
Niveau	500

Doel vak

Understanding and predicting molecular structure and chemical reactivity.

Inhoud vak

Theoretical Chemistry has become an integral part of modern chemistry. Numerous properties can be computed with chemical accuracy, thus, enabling one to study or predict quantities that are hardly or not accessible through experimental techniques. But with this, the potential of theoretical chemistry is still not exhausted. In order to design syntheses, catalysts or pharmacologically active molecules in a more rational fashion (i.e., instead of using a trial-and-error approach), it is of crucial importance to combine accuracy with solid and profound insight into the underlying mechanisms in the electronic structure. This holds true also if such investigations are done in the form of

computational chemistry. Such insight can be obtained through detailed analyses of the computed wavefunction and bond energy. The purpose of this course is to acquire the skills that one needs for a minute understanding of the nature of a chemical phenomenon. Here, the molecular orbital (MO) model contained in the so-called Kohn-Sham density functional theory plays a pivotal role.

Onderwijsvorm

The course consists of an intensive theoretical introduction in the first week followed by a research project in which the student participates in one of the research lines of the group.

Toetsvorm

Examination of the course occurs on the basis of a research report.

Literatuur

Parts of: (a) T. A. Albright, J. K. Burdett, M.-H. Whangbo, *Orbital Interactions in Chemistry*, Wiley-Interscience, New York, 1985; (b) F.M. Bickelhaupt, E.J. Baerends, *Kohn-Sham Density Functional Theory: Predicting and Understanding Chemistry*, in: *Rev. Comput. Chem.*; K.B. Lipkowitz, D.B. Boyd, Eds.; Wiley-VCH: New York, Vol. 15.

Aanbevolen voorkennis

BSc Scheikunde of BSc Farmaceutische Wetenschappen

Doelgroep

MSc Chemistry en MSc DDS

Applied Theoretical Chemistry

Vakcode	X_435612 (435612)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. F.M. Bickelhaupt
Examinator	prof. dr. F.M. Bickelhaupt
Niveau	500

Doel vak

Understanding and predicting molecular structure and chemical reactivity.

Inhoud vak

Theoretical Chemistry has become an integral part of modern chemistry. Numerous properties can be computed with chemical accuracy, thus, enabling one to study or predict quantities that are hardly or not at all accessible through experimental techniques. But with this, the potential of theoretical chemistry is still not exhausted. In order to design syntheses, catalysts or pharmacologically active molecules in a more rational fashion (i.e., instead of using a trial-and-error approach), it is of crucial importance to combine accuracy with solid and profound insight into the underlying mechanisms in the electronic structure. This holds true also if such investigations are done in the form of computational chemistry. Such insight can be obtained through detailed

analyses of the computed wavefunction and bond energy. The purpose of this course is to acquire the skills that one needs for a minute understanding of the nature of a chemical phenomenon. Here, the molecular orbital (MO) model contained in the so-called Kohn-Sham density functional theory plays a pivotal role.

Onderwijsvorm

The course consists of an intensive theoretical introduction in the first week followed by a research project in which the student participates in one of the research lines of the group.

Toetsvorm

Examination of the course occurs on the basis of a research report.

Literatuur

Parts of: (a) T. A. Albright, J. K. Burdett, M.-H. Whangbo, Orbital Interactions in Chemistry, Wiley-Interscience, New York, 1985; (b) F.M. Bickelhaupt, E.J. Baerends, Kohn-Sham Density Functional Theory: Predicting and Understanding Chemistry, in: Rev. Comput. Chem.; K.B. Lipkowitz, D.B. Boyd, Eds.; Wiley-VCH: New York, Vol. 15.

Aanbevolen voorkennis

BSc Scheikunde of BSc Farmaceutische Wetenschappen

Doelgroep

mCh, mDDS

Overige informatie

This course exists in two variants. The first variant is worth 6 cp (code 435612) and can be extended to 12 cp (code 432501).

Big Issues in Emergent Energy Materials

Vakcode	X_422587 ()
Periode	Periode 1
Credits	6.0
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Doelgroep

MPhysics

Intekenprocedure

Opgave via <https://www.sis.uva.nl> tot 4 weken voor aanvang van het semester is verplicht

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Bio-analysis & Clinical Diagnostics

Vakcode	X_432765 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels

Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Docent(en)	dr. H. Lingeman
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

Giving a clear account on the instrumental bio-analytical techniques and strategies in bio-analysis an clinical diagnostics.

Inhoud vak

This basic course on bio-analytical and clinical chemistry is focusing on decision trees (strategic decisions) that can be used during the method development and optimization of analytical procedures to determine both endogenous and exogenous compounds in complex biological samples. Approaches and procedures with respect to sampling, sample preparation, separation, spectroscopy, electrochemistry, as well as immunological and enzymatic procedures will be dealt with. Case studies will be used to clarify the decisions that have to be taken.

Onderwijsvorm

Lectures and tutorials.

Toetsvorm

Written or oral examination.

Literatuur

Hand-outs (electronically available).

Aanbevolen voorkennis

Basic knowledge of biochemistry, chromatography, electrophoresis and mass spectrometry.

Doelgroep

mCH-AS, mDDS, mMNS

Biomedical Modelling and Simulation

Vakcode	X_430112 (430112)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. I.H.M. van Stokkum
Examinator	dr. I.H.M. van Stokkum
Docent(en)	dr. I.H.M. van Stokkum, prof. dr. G.J.M. Stienen, dr. ir. T.J.C. Faes, dr. J.C. de Munck
Lesmethode(n)	Hoorcollege, Werkcollege, Practicum, Werkgroep
Niveau	400

Doel vak

To gain knowledge of the most important theoretical and practical concepts in modelling and simulation of biomedical processes at different scales, ranging from macroscopic organ function, cellular function down to biochemical interactions and signaling pathways within cells.

To gain experience with and to apply MatLab and Mathematica to acquire, analyse and evaluate biomedical signals and to model and simulate biomedical processes.

Inhoud vak

This course will start with a general overview the various types of models used to describe biomedical processes by parametric and non-parametric models using linear and non linear (differential) equations. Basic knowledge of vector and matrix calculations and differential equations is required but will be refreshed.

During the course, attention will be paid to viscoelastic models, spectral analysis, compartment models, geometric modelling used in image analysis and models to describe molecular structures and their dynamic behaviour.

Examples will concentrate on cardiovascular function: linear and nonlinear viscoelastic models of pressure volume relations, compartment models of the interaction between contractile proteins to simulate force and pressure development and a description of an ion pump for instance to import Ca-ions into the cell during an action potential.

The introductory lectures will be combined and followed by practical courses in which, through exercises, experience will be gained of MatLab and Mathematica (4th generation computer languages). Finally students will be offered a choice of 1 out of 5 modelling problems to be solved in groups of 2 or 3 students each, guided by a supervisor. At the end of the course each group will present and discuss their work with all participants and supervisors of the course.

Onderwijsvorm

Lectures, working groups, assignments.

Toetsvorm

Assignments (20%), report and presentation on modelling problem (40%) and written exam (40%).

Literatuur

Syllabus.

Book (recommended): Gilat, A., MatLab: An Introduction with Applications 5th ed, Wiley.

Doelgroep

mCh-SBI, mMNS-MPs, mMNS-PoL, mMNS-MPy, mPhys-PLH, mPhys-SBI

Biomolecular Simulations

Vakcode	X_437019 (437019)
Periode	Periode 4

Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	500

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/en/c/11008.html>

Doelgroep

mCh

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Bio-Organic Chemistry

Vakcode	X_435669 (435669)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Docent(en)	prof. dr. ir. R.V.A. Orru
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

The use of Biotransformations in Synthesis as well as advanced understanding of Natural Product Chemistry.

Inhoud vak

This course gives an overview of the most important classes of biocatalysts. It describes the properties of biocatalysts and their use in biotransformations. The advantages and disadvantages of the use of enzymes will be discussed as well as the basic principles in enzyme-catalyzed asymmetric synthesis. Further, a detailed overview of the fundamental classes of Natural Products is given. Thus, Terpenes and Steroids, Alkaloids, Fenolics, Fatty acids and Prostaglandines, Polyketides will be covered. Not only the basic structural and physical properties but also synthetic aspects and bio-synthesis are a major part of this course.

Onderwijsvorm

Lectures, tutorials, assignments

Toetsvorm

Written examination and assignments

Literatuur

Will be provided by the lecturers.

Vereiste voorkennis

BSc

Aanbevolen voorkennis

BSc Scheikunde

Doelgroep

mCh-MDSC

BioSolar Cells

Vakcode	X_428531 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Docent(en)	dr. J.P. Dekker
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

To obtain insight in the three main themes of BioSolar Cells (in short research to improve the efficiency of photosynthesis in plants, research to produce biofuel or other products from algae on a semi-industrial scale and research to convert solar energy directly into a fuel in an artificial leaf with very high efficiency), and to perform a literature study on one of the themes from BioSolar Cells.

Inhoud vak

BioSolar Cells is a Dutch national research programme with the aim to optimize the photosynthesis process in plants, algae and bacteria, and to develop 'artificial leaves' that combine physical and chemical components. The course will start with interactive lectures by experts on each of the three themes from BioSolar Cells. The students will have to read one or two papers before each lecture and formulate research questions, after which the lecturer gives his/her lecture and the questions are discussed. In the second stage of this course, the students choose a research topic, conduct a literature study, prepare a scientific review paper and present their work in a session with all participating students and staff.

Onderwijsvorm

Interactive lectures and literature study.

Toetsvorm

Assessment of scientific review article and of a presentation.

Literatuur

Scientific papers

Doelgroep

mCh-SES, mPhys, mPhys-SBI, mCh-SBI

Biosystems Data Analysis

Vakcode	X_437001 (437001)
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2014-2015/zoek-vak/vak/12461>

Doelgroep

mBio, mCh

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Business and Innovation in Life Science

Vakcode	X_432539 (432539)
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	drs. P. van Hoorn
Examinator	drs. P. van Hoorn
Docent(en)	prof. dr. I.J.P. de Esch, drs. P. van Hoorn
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

This course positions the field of Biomolecular Sciences in a broader context by sketching out the Pharma-Biotech industrial landscape.

Inhoud vak

The Pharma-Biotech industrial landscape is presented in several ways;

1. business and value chain modeling common in these industries
2. product strategy and life-cycle dynamic in the Pharma and Biotech sector
3. innovation and the position of Genomics and Proteomics in the future of Health and Life Sciences

In addition to lectures on the above 3 topics, students will be handed certain texts and articles that illustrate the 'State of the Art' in the

Pharma-Biotech industrial sector from both a product development as well as from a business development standpoint.

As a result the student will get insight into the business decisions and dynamic that are linked to basic bioscientific research through product development. The course thus aims to provide a first general overview of how life science and business are interwoven in everyday industrial practice.

Two `real-life` cases will be discussed and students will execute a group assignment in which the cases will have to be analyzed and certain questions will have to be answered. Each group writes a short analysis and subsequently presents this in front of the whole group.

As part of this course, a guest speaker from industry will be giving a lecture.

Onderwijsvorm

Lectures, guest lectures by industrial and Life Science venture capital firm representatives, final presentation.

Two harvard case will be used including assignments.

Toetsvorm

In order to receive 3 credits for this course, the following criteria must be met:

- the written exam must be passed with a grade 6 or more (50% of final grade)
- case analysis and presentation in front of the entire class with a grade 6 or more (50%)

Written exam w 4 open questions.

Literatuur

Rydzewski - Real world Drug Discovery , A chemist's guide to Biotech and Pharmaceutical Research (selected chapters)- 2008

Additional literature provided on Blackboard.

Vereiste voorkennis

This course assumes students have a thorough knowledge and understanding of the life sciences, including biochemistry.

Aanbevolen voorkennis

Completed Bachelor Physics, Chemistry, Biology, Medical Biology
Pharmaceutical Sciences, Medical Natural Science or Science Business and Innovation.

Doelgroep

Master Bio molecular Sciences (BMS) , Chemistry, Drug Discovery & Safety and Oncology

Overige informatie

In case you have any questions about this course, please send an Email to the coordinator at <p.van.hoorn@vu.nl>;

Business Management in Health and Life Sciences

Vakcode	AM_470584 ()
----------------	--------------

Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	prof. dr. H.J.H.M. Claassen
Examinator	prof. dr. H.J.H.M. Claassen
Docent(en)	prof. dr. H.J.H.M. Claassen
Lesmethode(n)	Hoorcollege, Computerpracticum
Niveau	500

Doel vak

To acquire insight in different legal entities in which to organise a company or enterprise

To get acquainted with:

- financial and legal aspects
- patents and alternative valorization methods
- marketing and sales aspects of businesses

To acquire insight in Human Resource Management models

To get acquainted with different models of financing

To learn to think and act in line with economic and sustainability issues for the company

Inhoud vak

Increasingly, health students will be confronted with a corporate way of thinking in health organisations. To function in such an environment it is critical that students have basic knowledge of fiscal and legal entities and organisational forms of corporate structures (including start-ups). Furthermore, they have to understand what motivates decision makers and financial officers in different companies (also geographical differences). This course comprises a theoretical and a practical part. The theoretical part consists of interactive classes with various experts from the field. Topics that will be dealt with in detail include: intellectual property, portfolio management, finance, risk capital, grants and subsidies, team building and people management, different legal entities, fiscal and legal aspects when starting a new company, SWOT analysis in the life sciences and clinical trials. The practical part consists of bringing the knowledge acquired during the classes into practice in an assignment in which you develop a (personal career) businessplan.

Onderwijsvorm

Lectures: 35h

Assignment: 4h

Work on assignment (self study): 40h

Preparing the exam: 81h

Toetsvorm

Written exam: 50%

Personal Business Plan: 50%

Both have to be passed

Literatuur

Will be announced on Blackboard 1 month before the start of the course

Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences.

Overige informatie

Guest lecturers/organisations:

- Robert Al, TU Eindhoven
- Tamar Weenen, VU university
- Esther Pronker, VU university
- Patrick de Boer & Jochem Bosschenbroek, Ttopstart BV
- Bart van Weezenbeek
- Bart Bergstein, Forbion Capital partners
- Michael Mellink & Majorie Soeter, Odgersberndtson
- Marga Janse, innovatief LerenLeren BV
- NL Octrooicentrum
- Price Waterhouse Coopers
- AsjesBisseling Belastingadviseurs
- And others to be announced

Business, Innovation and Value Creation in the Life Science Industry

Vakcode	X_432723 ()
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	drs. P. van Hoorn
Examinator	drs. P. van Hoorn
Docent(en)	prof. dr. I.J.P. de Esch, drs. P. van Hoorn
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Business Innovation and Value Creation in the Life Sciences Industry aims to provide two distinct goals:

- To provide in depth and comprehensive insight in current business , innovation and entrepreneurship trends, approaches and state-of-the-art practice in the LSI through theory, literature and case analysis.
- To utilize and apply insights and experiences gained under a. in a personal live entrepreneurship case in which each individual student elects a case. And develops a business plan according to a set methodology. Essential parts of this process include: building strategy, business modeling, transactional modelling, building a value proposition, leveraging IP, marketing and commercialization planning.

Inhoud vak

The LSI landscape is shown in several ways:

1. Understanding the Pharma Biotech and Health Care sectors and its primary and secondary drivers, including the contributing sciences
2. Understanding relevant business, value chain and innovation models that are common in these industries and sectors
3. Understanding typical product life-cycle dynamics in the Pharma and Biotech and related Health sectors

4. Understanding the relative contribution and position of Genomics, Proteomics and other scientific specialization areas in the future of Health and Life Sciences

5. Understanding current product categories and the future of diagnosis, therapy and prevention

In addition to lectures on the above topics, students will be handed certain texts and articles that illustrate the 'State of the Art' in the LSI sector from both a product development as well as from a business development standpoint.

As a result the student will get insight into the business decisions and dynamic that are linked to basic bio-scientific research from inception through to product development and commercialization. The course thus aims to provide a general overview of how life science and business are interwoven in everyday industrial practice.

Two 'real-life' cases will be discussed and students will get a group assignment in which the cases will have to be analyzed and certain questions will have to be answered. Each group writes a short analysis and subsequently presents this in front of the whole group.

Subsequently, each student will engage in a personal assignment as described above. The outputs will consist of a presentation before the whole group. The aim is to provide as real life a setting as is possible.

Onderwijsvorm

A mix of lectures, guest lectures, Pharma sector casework and related assignments. Individual coaching on the business planning exercise. Outputs include report and oral presentations and a final written exam.

Toetsvorm

In order to receive 6 credits for this course, the following criteria must be met:

- the written exam must be passed with a grade 6 or more (50% of final grade)
- the assignment must be completed with a written document and short presentation before the group (50% of final grade)

Literatuur

Selected scientific publications

Harvard Business Cases as posted on blackboard.

New World Drug Development by R Robert M. Rydzewski 2008

Business Model Generation – Osterwalder 2010

Vereiste voorkennis

Completed Bachelor SBI or comparable

Doelgroep

M Chem -SBI or M Physics - SBI

Overige informatie

In case you have any questions about this course, please contact the coordinator at <p.van.hoorn@vu.nl>;

Capillary Electrophoresis

Vakcode	X_437002 (437002)
Periode	Periode 3

Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

The course description is available at

<http://studiegids.uva.nl/web/uva/sgs/en/c/243.html>

Doelgroep

mCh

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Catalysis for sustainable energy

Vakcode	X_437027 ()
Periode	Periode 4
Credits	6.0
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	500

Inhoud vak

<http://studiegids.uva.nl/web/uva/sgs/nl/c/14334.html>

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Chemical Analysis for Forensic Evidence

Vakcode	X_437003 (437003)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	500

Inhoud vak

The course description is available at

<http://studiegids.uva.nl/web/uva/sgs/en/c/8069.html>

Doelgroep

mCh

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Chemical Biology

Vakcode	X_432538 (432538)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. R. Leurs
Examinator	prof. dr. R. Leurs
Docent(en)	prof. dr. R. Leurs
Lesmethode(n)	Hoorcollege, Computerpracticum
Niveau	400

Doel vak

To get students acquainted with modern chemical biology techniques to study proteins and the modulation of their function, with a specific emphasis on drug discovery

Inhoud vak

In this course emphasis will be given on the interface between Chemistry and Biology. How can one understand biological processes using small molecules? How can one identify small molecules targeting new biochemical pathways, either by using modern biochemical or cellular assays (e.g. SPR, FRET, BRET, High-content & High resolution analysis), or in silico using the wealth of new information from structural biology? How to detect and/or modulate DNA, RNA and protein expression and/or function with chemical probes? These are the questions that are central to this course.

Onderwijsvorm

lectures, tutorial, consultancy sessions and case study/presentation

Toetsvorm

Students will work in small groups on an integrated case study. Based on primary literature, background information from Comprehensive Medicinal Chemistry, interaction with "Protein Champions", students will work on a "Chemical Biology Protein Report" and oral presentation. Finally, there will be a written examination at the end of the course on the various topics presented in the course.

Final grades will be based on results of the case study (35%), case presentation and discussion (15%) and final exam (50%). Each part must at least be satisfactory (mark "6 out of 10" or higher).

Literatuur

Selected book chapters from Comprehensive Medicinal Chemistry II, 2007, Elsevier, Editors-in-Chief: John B. Taylor and David J. Triggle (available at VU library as e-book) and primary literature.

Vereiste voorkennis

Bachelor Pharmaceutical Sciences, Medical Natural Science, Science, Business and Innovation or Chemistry, Portal course MSc Biomolecular Science, Signal Transduction in Health and Disease, or equivalent

Doelgroep

mBMS-BC, mCh-SBI, mDDS-BCCA, mDDS-CMCT, mDDS-DD&S, mDDS-DDSA, mDDS-DDTF, mDDS-C-var, mDDS-E-var, mDDS-M-var, mPhys-SBI

Intekenprocedure

Please register as soon as possible online.

Overige informatie

Presence is obliged at predefined moments of the course (e.g. kick-off meeting, presentation session, examination).

Clinical development and clinical trials

Vakcode	AM_470585 ()
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	prof. dr. H.J.H.M. Claassen
Examinator	prof. dr. H.J.H.M. Claassen
Docent(en)	prof. dr. H.J.H.M. Claassen
Lesmethode(n)	Hoorcollege, Computerpracticum, Werkgroep
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objectives of drug and clinical development process

To acquire knowledge and insight into the clinical pharmacology in drug development, drug interactions, pharmacodynamic and metabolic interactions

To acquire knowledge and insight into clinical study methodology

To acquire knowledge and skills into the regulatory principles

To acquire knowledge of ICH-GCP and quality

To acquire knowledge and insight into clinical trial coordination

To acquire knowledge and skills into the data management and statistics.

To acquire insight into the ethical aspects

To acquire insight into actual use of clinical trials in R&D strategies

To learn to design a clinical study

To acquire insight into the different epidemiologic study designs

To acquire knowledge and skills into how exposure and disease in a population can be measured and how the relationships between them can be assessed (using SPSS)

To acquire knowledge and skills into interpreting and presenting the results of an epidemiologic study

Inhoud vak

The need for rigorous evaluation of components of health care is increasingly recognised worldwide. An important type of evaluation is the clinical trial. The most commonly performed clinical trials evaluate new drugs, medical devices, biologics, or other interventions on patients in strictly scientifically controlled settings, and are required for regulatory authority approval of new therapies. This course

aims to provide students with a theoretical and practical understanding of the issues involved in the design, conduct, analysis and interpretation of clinical trials of health interventions. Furthermore classes are provided on which the actual use of clinical trials in day to day R&D strategies within industry and universities is addressed in detail. Classes include: 'Life Cycle of a Clinical Trial', 'Clinical Trial Methodology', 'ICH-GCP Principles', 'The Ethics Committee', 'Safety Considerations in Clinical Trials', 'Quality Control & Quality Assurance', 'Compliance, Misconduct & Fraud'.

An additional week of basic epidemiology will help you to complement the knowledge obtained so far in the course with an understanding of the principles of other types of study designs (cross-sectional, longitudinal, case-control). Issues concerning exposure and disease measurement and exposure-disease relationships will be discussed in detail, and examples will be provided. Together with your colleagues, you will learn how to apply this knowledge first by hand (during the lectures), then to an epidemiologic database (during the computer-based sessions) and how to interpret the results critically.

Onderwijsvorm

Lectures: 25h

(Computer) workgroup: 32h

Preparing the exam: 2h

Toetsvorm

Written exam: 100%

Literatuur

Will be announced on Blackboard 1 month before the start of the course

Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences.

Overige informatie

Guest lecturers/organisations:

- Eric Klaver
- DOCS
- Others to be announced

Colloquium and Literature Thesis

Vakcode	X_432578 (432578)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Colloquium and Literature Thesis

Vakcode	X_432579 (432579)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Colloquium and Literature Thesis

Vakcode	X_432581 (432581)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	600

Doel vak

Literature study on a topic related to biomolecular analysis.

Inhoud vak

The topic will be chosen in close cooperation and with approval of the master coordinator.

Onderwijsvorm

Selfstudy and discussion sessions.

Toetsvorm

Report and presentation.

Doelgroep

mCh-AS

Colloquium and Literature Thesis

Vakcode	X_432580 (432580)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru

Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Communication, Organization and Management

Vakcode	AM_470572 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. T.P. Groen
Examinator	dr. T.P. Groen
Docent(en)	dr. H. Wels, prof. dr. F. Scheele, dr. M.B.M. Zweekhorst
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

- To get acquainted with theories on organisational behaviour
- To obtain a deeper understanding of communication from the perspective of sharing and influencing results
- To acquire knowledge on organisational structures and designs
- To get acquainted with important theories on organisational transitions and change management
- To acquire insight into different management practices in the health and life sciences sector
- To gain insight in leadership and interpersonal behaviour
- To obtain insight in methods for motivation and conflict management
- To improve communication skills
- To practise analytical and advisory skills

Inhoud vak

Organisations in the health and life science sector are changing fast, a phenomenon driven by newly emerging technologies and increasing societal complexity. A growing number of students with a beta degree will hold professional and managerial functions in these organisations. During this course students will learn how to be effective performers within these environments, both individually and in teams. This requires an understanding of the macro aspects of organisational behaviour, including designing organisations, managerial skills and ways of strategic thinking. Several speakers conduct lectures on aspects as motivation, managing interpersonal behaviour, leadership, communication and developing and changing organisations. The speakers explain theories from literature and relate them to their practical experiences. In addition, the students interview managers in health organisations and analyse these interviews using the newly acquired theoretical concepts. Also, practical cases of health care companies will be analysed and discussed, resulting in advisory reports for management. With the other students you discuss your experiences and a coach helps you relate the experiences to theory.

Onderwijsvorm

Lectures (approximately 22 hours), response lectures (4 hours), self study, training workshops (12 hours), self-study and writing project assignment (approximately 120 hours).

Toetsvorm

Written exam (60%); and assessment of the interviews, case study analysis, and reports (40%). Grades of both parts must at least be 6 or higher.

Literatuur

To be announced on Blackboard

Doelgroep

Compulsory course within the Master programme Management, Policy Analysis and Entrepreneurship for the Health and Life Sciences (MPA) and the Societal differentiation of Health, Life and Natural Sciences Masters programmes

Overige informatie

Attendance to training, workshops, interviews and discussions is indispensable

Coordination and Organometallic Chemistry

Vakcode	X_435664 (435664)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/nl/c/208.html>

Overige informatie

Registration via <https://www.sis.uva.nl> is mandatory 4 weeks before the start of the Semester.

Current Sustainable Energy Technologies

Vakcode	X_422582 ()
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Docent(en)	dr. J.P. Dekker, dr. R.N. Frese
Lesmethode(n)	Hoorcollege, Werkcollege

Niveau	500
---------------	-----

Doel vak

To obtain a complete overview of the technical, economic and societal feasibilities of all possible forms of sustainable energy, including relevance and positive and negative effects. The students should be able to explain the basic features of these technologies and should also be able to make quantitative predictions for each of these technologies.

Inhoud vak

In week 1, students read all chapters of the book and formulate for each chapter a technological and/or economic/societal question. The question will be accompanied with hypothetical answers or estimations or working hypotheses. Answers must be as quantitative as possible. In week 2, students will present and discuss their questions and hypotheses with their group. Then, participants will be handed specific assignments for further research. In week 3, students will present the results of their further research, and will receive feedback from the other participants in their group. In week 4, students will give their final presentations to all participants of the course and will hand in the final report of their work.

Onderwijsvorm

Introductory lecture in week 1, five discussion meetings in weeks 1, 2 and 3 in groups of about 10 students, final meeting with all participants in week 4 in which students present their most important worked-out question.

Toetsvorm

Initial questions, hypothetical answers and participation in the discussion result in 50% of the grade. The final document constitutes also 50% of the grade. All documents will be graded by two independent lecturers, their marks will be averaged. Both parts need to have a mark of 6.0 or higher.

Literatuur

David J.C. Mackay (2008) Sustainable energy – without the hot air, available free online at <http://www.withouthotair.com>

Vereiste voorkennis

mCh-SBI

Doelgroep

mCh-SBI, mPhys-SBI, mCh-SES, mPhys-SES

Density Functional Theory for Chemists

Vakcode	X_435111 (435111)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. F.M. Bickelhaupt
Examinator	prof. dr. F.M. Bickelhaupt
Niveau	500

Doel vak

Understanding basic concepts of Density Functional Theory (DFT), in particular, Kohn-Sham DFT, and its application to understanding and predicting chemical bonding, molecular structure, and reactivity.

Inhoud vak

Electron density, Hole functions, Electron density as basic variable instead of the wavefunction, Hohenberg-Kohn theorems, Kohn-Sham approach, Approximate exchange-correlation functionals, Basic machinery of DFT computer programs.

Onderwijsvorm

zelfstudie

Toetsvorm

Oral exam

Literatuur

Parts of: (a) W. Koch en M. C. Holthausen, A Chemist's Guide to Density Functional Theory; Sec. Ed.; Wiley-VCH Verlag: Weinheim, 2000.; (b) F.M. Bickelhaupt, E.J. Baerends, Kohn-Sham Density Functional Theory: Predicting and Understanding Chemistry, in: Rev. Comput. Chem.; K.B. Lipkowitz, D.B. Boyd, Eds.; Wiley-VCH: New York, Vol. 15.

Overige informatie

Period: in consultation with the lecturer

Density Functional Theory for Chemists

Vakcode	X_435112 (435112)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. F.M. Bickelhaupt
Examinator	prof. dr. F.M. Bickelhaupt
Niveau	500

Doel vak

Understanding basic concepts of Density Functional Theory (DFT), in particular, Kohn-Sham DFT, and its application to understanding and predicting chemical bonding, molecular structure, and reactivity.

Inhoud vak

Part I (6 ECTS): Electron density, Hole functions, Electron density as basic variable instead of the wavefunction, Hohenberg-Kohn theorems, Kohn-Sham approach, Approximate exchange-correlation functionals, Basic machinery of DFT computer programs. Part II (6 ECTS): Molecular structure, Vibrational frequencies, Thermochemistry, Hydrogen bonds, Kohn-Sham molecular orbital (MO) model of the electronic structure and chemical bond, Chemical reactivity.

Onderwijsvorm

zelfstudie

Toetsvorm

Oral examination.

Literatuur

Parts of: (a) W. Koch en M. C. Holthausen, A Chemist's Guide to Density Functional Theory; Sec. Ed.; Wiley-VCH Verlag: Weinheim, 2000.; (b) F.M. Bickelhaupt, E.J. Baerends, Kohn-Sham Density Functional Theory: Predicting and Understanding Chemistry, in: Rev. Comput. Chem.; K.B. Lipkowitz, D.B. Boyd, Eds.; Wiley-VCH: New York, Vol. 15; (c) Other selected tutorial reviews (in consultation).

Doelgroep

mCh, mPhar

Overige informatie

Period: in consultation with the lecturer

Disability and Development

Vakcode	AM_470588 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	H.B. Miranda Galarza MSc
Examinator	H.B. Miranda Galarza MSc
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

- To develop an understanding of disability and the issues faced by people with disabilities
- To develop knowledge and skills for disability research, policy development and management related to disability, rehabilitation and development
- To acquire insight into the epidemiology of disability, with separate attention for important determinants like gender, poverty and HIV/AIDS
- To learn how to use relevant models of disability and the conceptual framework of the International Classification of Functioning, Disability and Health (ICF)
- To understand the importance of human rights in relation to disability and to learn to use the UN Convention for the Rights of Persons with Disabilities for advocacy and other rights-based interventions
- To acquire skills and knowledge in measurement and research methods relevant to disability
- To understand the importance of inter-sectoral collaboration
- To gain insight in participatory approaches

Inhoud vak

The Disability and Development (D&D) course focuses on a broad range of issues related to disability and rehabilitation in the context of

development. This means that the focus is on people with disabilities in low and middle-income countries. Disability affects an estimated 1 billion people worldwide, the majority of whom live in low and middle-income countries. The large majority are poor and have no access to rehabilitation services; neither are facilities in place to allow them to be included in the mainstream of society.

To date, very few services and programmes are available to address these needs. The realisation that the Millennium Development Goals cannot be met without addressing the needs of people with disability has brought a new impetus to the field of disability and development. Another major recent development was the adoption of the UN Convention on the Rights of Persons with Disabilities in December 2006. It is expected that there will be a substantial increase in demand for training of a large variety of professionals (e.g. researchers, managers, architects, lawyers, health professionals) with formal training and qualifications in the field of disability-inclusive development.

This rapidly increasing interest in disability, as a development and human rights issue, means that this emerging field of study will rapidly gain in importance and should become part of any serious higher education programme in social and development studies and in international public health. The course will cover essential knowledge and skills in this subject.

The 4-week course programme will include the following subjects:

- Disability models and stereotypes,
- Frequencies and distribution of disability,
- Experience of having a disability,
- ICF conceptual framework,
- Disability rights, including the UN Convention on the Rights of Persons with Disabilities,
- Culture and disability,
- Determinants of disability, including stigma and discrimination, poverty, gender and HIV/AIDS,
- Disability-relevant research methods, including examples of disability research
- An introduction to community-based rehabilitation and disability inclusive development.

Onderwijsvorm

Problem-based learning supported by lectures and an article writing assignment

The programme comprises 168 study hours, divided as follows:

- Lectures: 36
- Tutorial groups: 18
- Other events: 12
- Self-study: 102

Toetsvorm

Participation in tutorial groups: 10%

Take-home examination, submitted electronically: 60%

Scientific article: 30%

Literatuur

See e-reader

Vereiste voorkennis

Bachelor-level education; any subject

Doelgroep

The Disability & Development module is an optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life Sciences (MPA), International Public Health and Biomedical Sciences; external students from low and middle-income countries are strongly encouraged to apply. We encourage the participation of students with disabilities, especially from low and middle-income countries.

Overige informatie

For more information contact dr. Christine Dedding (c.dedding@vu.nl) or dr. Beatriz Miranda Galarza (b.mirandagalarza@vu.nl)

Electrochemistry and Bioelectrochemistry

Vakcode	X_432798 ()
Periode	Periode 4+5+6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	500

Doel vak

voor meer informatie neem contact op met Prof. Lies Bouwman@lic.leidenuniv.nl

Inhoud vak

<https://masters.lic.leidenuniv.nl/courses/2013-2014/ebe>

English Academic Course

Vakcode	X_437028 ()
Periode	Periode 2+3, Periode 5+6
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/web/uva/sgs/nl/c/11181.html>

Doelgroep

mCh, mPhys

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Entrepreneurship in Health and Life Sciences

Vakcode	AM_470575 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	prof. dr. E. Masurel
Examinator	prof. dr. E. Masurel
Docent(en)	prof. dr. E. Masurel
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

Students obtain knowledge about and insight in the relevance of entrepreneurship and innovation for their own discipline. Students learn about the processes which are involved in the recognition and exploitation of opportunities, about creating economic and social value and about the nature and role of networks. In addition students gain knowledge of different entrepreneurial processes and the importance of valorisation of (bio)medical findings and business ideas for a knowledge-based economy.

Learning objectives

- Become familiar with an innovation outlook on entrepreneurship.
- Become aware that value-adding opportunities not only contain financial aspects but also social and ecological aspects (sustainable entrepreneurship).
- Gain the ability to write a feasibility plan on how to bring an innovation to the market.
- Obtain knowledge about and insight in the relevance of entrepreneurship and innovation for science disciplines.
- Learn about the processes which are involved in the recognition and exploitation of opportunities, about creating economic and social value and about the nature and role of networks.
- Gain knowledge of different entrepreneurial processes and the importance of valorisation of (bio)medical findings and business ideas for a knowledge-based economy.

Inhoud vak

This course consists of two tracks: a theoretical track and a practical track. These two tracks run simultaneously. In the first track you learn about entrepreneurship. Answers are found on questions such as: What is entrepreneurship? What defines an entrepreneur? What are entrepreneurial opportunities? What is the role of innovation in entrepreneurship? What is corporate social responsibility (CSR)? How can we judge the feasibility of entrepreneurial ambitions? Simultaneously you work on an assignment (second track). In the first week of this course you search for an innovation in your own discipline (product, service, process etc). Your choice must be approved by the lecturers. The first part of the assignment consists of a description of the innovation which you have chosen. Subsequently, you make a SWOT-analysis and a network analysis of the innovation. Also a paragraph on CSR aspect should be added. The final part of the assignment is your own feasibility study: how would you valorize the innovation to the market?

Onderwijsvorm

Lectures, personal meetings. Each week scientific lectures are given (on entrepreneurship, SWOT-analysis, innovation, CSR etc). These lectures are both the basis for the exam and for the assignment. Each week the student has a short meeting with his / her supervisor, in order to discuss the progress of his/her assignment.

Schedule and study time

The total study time is 160 hours.

Tuition methods include lectures, consultancies and self-study.

The different elements have the following study time:

- lectures 18 hours
- consultancies 8 hours
- writing feasibility plan 65 hours
- self study 65 hours
- examination 4 hours

Toetsvorm

You conduct a written exam and an assignment. Both the exam and the assignment determine 50% of the grade. The exam and the assignment must be of sufficient quality.

Literatuur

To be announced on Blackboard

Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life sciences (MPA), M-differentiation of the Health, Life & Natural Sciences, Biology, Biomedical Sciences.

Overige informatie

Attendance is compulsory. Prior knowledge: Business Management in Health and Life sciences. For information and application:

anna.van.luijn@falw.vu.nl

Environmental Chemistry

Vakcode	X_437004 (437004)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

The course description is available at

<http://studiegids.uva.nl/web/uva/sgs/nl/c/14420.html>

Doelgroep

mCh-AS, mCh-MDSC, mCh-SES, mPhys-SES

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Ethics and Academic skills

Vakcode	X_432725 ()
Periode	Ac. Jaar (september)
Credits	1.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Doel vak

In order to plan this course please contact your mastercoordinator for details

Ethics and Academic skills

Vakcode	X_432726 ()
Periode	Ac. Jaar (september)
Credits	2.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Doel vak

In order to plan this course please contact your mastercoordinator for details

Ethics and Academic Skills

Vakcode	X_437556 (437556)
Periode	Ac. Jaar (september)
Credits	6.0
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Doel vak

In order to plan this course please contact your mastercoordinator for details

Ethics and Academic Skills

Vakcode	X_432517 (432517)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels

Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Doel vak

In order to plan this course please contact your mastercoordinator for details

Inhoud vak

Period: Variable

Ethics in Life Sciences

Vakcode	AM_470707 ()
Periode	Periode 3
Credits	3.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	prof. dr. J.T. de Cock Buning
Examinator	prof. dr. J.T. de Cock Buning
Docent(en)	prof. dr. J.T. de Cock Buning, dr. J.F.H. Kupper
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

To provide a toolbox of ethical instruments to analyze properly moral problems related (to one's own) research in the life sciences

- To acquire conceptual knowledge of the central concepts in applied philosophy and professional ethics
- To challenge an ethical reflection on one's own life science specialization and to open it for an impartial and constructive discussion
- To exercise a team based project to enter prepare and execute a moral dialogue
- To acquire the necessary skills to handle ethical issues in an accountable manner, as a professional academic beyond one's own inclinations and prejudgments

Inhoud vak

Researchers in life sciences generate the knowledge that builds the future of our society. Therefore, professional academics should be accountable for their decisions, experimental designs and presentation of results. In this short course, the principles of justification will be illustrated with cases of technology ethics and medical ethics. The way an ethical review committee on animal research works, is simulated by a role play exercise on an actual research protocol. Finally, as a small group training project, an ethical dialogue is prepared and executed together with another team.

Onderwijsvorm

Ethics in the Life Sciences is a fulltime course of four weeks (3 ECTS). The total study time is 80 hours.

The different elements have the following study time:

- Lectures: 13 hours
 - Work groups: 17 hours
 - Group assignment: 24 hours
 - Exam: 2 hour
 - Presentation : 4 hours
 - Self working (reading in the first week): 20 hours
- Please note that attendance to the work group meetings is compulsory. Attendance to the lectures is highly recommended. In our experience, relying on self-study alone is insufficient to apply the theory of the lectures in the assignments of the workgroups, and to pass the exam.

Toetsvorm

- Degree of intellectual participation in the workgroups (10%)
- exam (50%) has to be passed
- written and verbal execution of the ethical dialogue (40%)

Literatuur

Available on Blackboard

Vereiste voorkennis

Bsc Biology, Biomedical Sciences, Psychology with profile Biological Psychology or Neuropsychology

Doelgroep

Compulsory course in all FALW Master programmes, except Health Sciences and Neuro Sciences

Overige informatie

Lectures in English, part of the workgroups are in Dutch. All presentations and plenary discussions in English.

In order to maximize the experience of differences in values and preferences, and this increase meaningful ethical inquiry we will place you randomly in the workgroups. Placement will be communicated after the introduction lecture.

Expertise and coördination in Knowledge Intensive Firms

Vakcode	X_432738 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

This course provides a theoretical framework for understanding how firms coordinate diverse expertise. Students become familiar with the most recent insights and questions in the literature on expertise and coordination. They learn how to recognize and analyze problems of coordination and to design solutions for work across diverse expert domains. They also practice their academic writing and analytical reasoning skills.

Inhoud vak

One of the prime organizational challenges is to coordinate across multiple diverse specializations. In organizations, work is distributed across departments, and employees become specialized in their job. Research is organized in disciplines, and scientists become expert at specific questions. While experts become very efficient in their own domain, they also become entrenched in their viewpoints and more unwilling and unable to reach across disciplinary and departmental divisions. Yet, we know that breakthrough knowledge and innovation arises at the interface of expert domains. Therefore, organizations have to integrate diverse specializations to fully leverage expertise. This course draws from literature such as expert knowledge, decision-making, and innovation to explore the fundamental coordination problem of the firm.

Onderwijsvorm

This course consists of six interactive seminar sessions and three tutorials. Students have to prepare assigned readings for each session.

Toetsvorm

Class participation (30%) and final written assignment (70%)

Literatuur

selected articles

Vereiste voorkennis

Technology & Innovation (Prof. Bossink)

Doelgroep

mCh-SBI, mPhys-SBI

Overige informatie

Enrollment is capped at 40 students.

Fundamentals of Analytical Sciences

Vakcode	X_435059 (435059)
Periode	Periode 4
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

To give insight in the procedures used in analytical chemistry, from sampling strategies to method validation and statistical approaches required for data interpretation.

Inhoud vak

In this course the general aspect of analytical methods, techniques and instrumentation will be discussed. The complete analytical procedure, from sampling to data handling and interpretation will be covered. Parameters to describe the quality of analytical methods will be defined. Principles of modern analytical instrumentation and data

acquisition techniques will be discussed. Attention will also be given to validation procedures and to quality control in analytical laboratories. An important part of the course is devoted to basic statistical techniques as used routinely in laboratories.

Onderwijsvorm

Lectures, workgroups and PC-use sessions.

Toetsvorm

Written examination.

Literatuur

Hands-outs (electronically available) and course syllabus.

Vereiste voorkennis

Basic knowledge of analytical chemistry.

Doelgroep

mCh-AS

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Green Chemistry

Vakcode	X_430557 (430557)
Periode	Periode 1
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. K. Lammertsma
Lesmethode(n)	Hoorcollege
Niveau	300

Doel vak

Acquiring knowledge of the general ideas of green chemistry and their importance in the development of sustainable chemical technology.

Inhoud vak

Sustainability and green chemistry focuses on 12 principles. Aspects like atom efficiency, chemical waste and manufacturing processes will be highlighted as well as catalysis, solvents, biomass, solar energy, alternative feedstock, energy consumption, and safety, all in the context of chemical sustainability. Important ingredients in the course are student presentations on these topics, assignments on selected topics, and an evaluation of the merits of the biobased economy.

Onderwijsvorm

Lectures, Group/Individual Assignments and Presentations

Toetsvorm

Written/oral examination, assignments, reports

Literatuur

Lancaster, M., Green Chemistry: An Introductory text. Cambridge: RSC (ISBN 0854046208).

The Dutch rapport "Naar groene chemie en groene materialen" - Kennis- en innovatieagenda voor de biobased economy, 2011 – or a similar English rapport.

Doelgroep

mCh-SBI, mPhys-SBI, mCh-SES, mPhys-SES

Health, Globalisation and Human Rights

Vakcode	AM_470818 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. C.W.M. Dedding
Examinator	dr. C.W.M. Dedding
Docent(en)	prof. dr. P. Heutink, dr. M.G.B.C. Bertens
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

The student;

- Is able to describe, understand and apply human rights concepts in a global context
- Develops a deeper understanding and A critical attitude towards scientific literature in the field of health, globalization and human rights in order to formulate soundly argued positions
- Is able to create his/her own vision with regard to the socio-cultural dimensions of human rights values in relation to public health
- Is able to apply methods of human rights assessment in relation to innovations in health care
- Demonstrates the ability to write and present according to academic standards

Inhoud vak

This course focuses on the human rights issues that are raised around the globe in connection with public health concerns. The course introduces the students to the effects of globalization on health issues, to the relevant UN human rights instruments on health and to the mechanisms to promote and protect these rights. Attention is given to a wide range of human rights topics in which health and well being play a crucial role. Examples are situations of armed conflict, reproductive rights, migration and refugee issues and childrens rights. Within the context of current globalisation processes the importance of local cultural insights into the human rights & public health interaction will be discussed. During the course students will prepare and participate in a simulation on a human rights assessment of innovations in health technology and discuss relevant scientific literature in study groups. In the exam students will show their creative problem-solving skills applying them to human rights dilemmas in public health.

Onderwijsvorm

Contact hours

Lectures: 33 hours

Work groups: 10 hours

Group project, simulation and exam: 8 hours

Self study and preparing: remaining hours

Toetsvorm

Group project (10%), Simulation (20%), exam (70%). All parts need to be passed (6.0)

Literatuur

To be announced at the start of the first work group/lecture

Doelgroep

Optional course for students in all differentiations of the Masters Health Sciences, Biomedical Sciences and Management, Policy Analysis and Entrepreneurship in Health and Life Sciences.

Overige informatie

(Guest) Lectures and guest organisations (under reservation):

Cees Hamelink

Christine Dedding (Children and rights)

Fiona Budge (Culture and Health)

Bert Keizer (Elderly Rights)

Els Mons (Rights and disabled persons)

Women on Waves

Doctors without Borders

And more to be announced.

For more information contact Wanda Konijn (w.s.konijn@vu.nl) or Anna van Luijn (a.van.luijn@vu.nl)

Heterogeneous Catalysis

Vakcode	X_428013 ()
Periode	Periode 3
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Doel vak

<http://studiegids.uva.nl/xmlpages/page/2014-2015/zoek-vak/vak/14343>

High-Throughput Screening

Vakcode	X_435047 (435047)
Periode	Periode 2
Credits	6.0
Voertaal	Engels

Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J. Kool
Examinator	dr. J. Kool
Docent(en)	dr. J. Kool
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

In depth study on the bio-analytical and screening aspects related to target and lead discovery of drugs.

Inhoud vak

During this course the potential of modern analytical and biological screening techniques used in target, hit and lead discovery will be discussed. The emphasis will be on the treatment of advanced sample preparation techniques (i.e. automation, high-throughput / combinatorial chemistry, miniaturization), biological and immunological high throughput screening assays and advanced separation methods. Also, the so called "Omics" will be discussed (e.g. proteomics and metabolomics). These techniques will be discussed in relation with pharmacokinetic studies and the applicability of the various techniques within the various stages of target discovery, hit screening, ADME(tox), and early lead discovery. Finally, miniaturization approaches will be dealt with.

Onderwijsvorm

The course starts with a thorough explanation on all subjects that will be discussed, and during which lecture. During the lectures, relevant literature per lecture will be mentioned. This literature is mainly from e-books (chapters) and from academic papers/reviews. All literature that will be mentioned can be found in the course documents on BlackBoard. All this literature has to be studied for the oral examination. All students will work on an assignment related to a topic in high throughput screening. This assignment results in a document and a PowerPoint presentation of 8 minutes.

Toetsvorm

Examination is in the form of an oral or written examination accounting for 50% of the final mark (depending on the number of students entering the course). All lectures and all literature provided are included in the examination. All material to be studied and learned for the examination can be accessed during the examination. Students can take all printed material and/or a computer with them during the examination. De presentation of 8 minutes followed by questions and replies to these questions constitutes 25% of the final mark. The Document's topic and the presentation's topic are related to each other. The document is between 6 and 8 pages (Times New Roman type 12; line spacing 1) including title page and with a maximum of 4 Figures/Tables. The assignment document constitutes the other 25% of the final mark. The marks of the examination, the presentation and discussion afterwards, and the assignment document all have to be sufficient (6.0). (If more than 12 students join this course, students will form groups of two students. In that case, the presentations will be given by both students per group and each presentation has a duration of 12 minutes. The document is then between 10 and 14 pages (Times New Roman type 12; line spacing 1) including title page and with a maximum of 6 Figures/Tables. The oral examination will then still be on individual

basis).

Literatuur

Please see the Course Documents on BlackBoard. The PowerPoint presentation named "HTS Course Overview" gives a detailed explanation/overview of the lectures, tutorials and course structure. All PowerPoint lectures will be placed on BlackBoard at least one day before each lecture. All PDF e-book chapters and other literature (e.g. academic research papers and reviews) can already be found on BlackBoard. It will be announced when each PDF literature is/are to be read in order to prepare for a respective lecture.

Aanbevolen voorkennis

Basic knowledge of biochemistry, separation sciences, spectroscopy and mass spectrometry.

Doelgroep

mCh-AS, mCh-MDSC, mDDS-BCCA, mDDS-DDTF

Homogeneous Catalysis

Vakcode	X_435668 (435668)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/en/c/205.html>

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Innovation in Medical Technology to Improve the Health Care System

Vakcode	X_430602 ()
Periode	Periode 6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. ir. T.J.C. Faes
Examinator	dr. ir. T.J.C. Faes
Docent(en)	dr. ir. T.J.C. Faes
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Doel vak

In innovative development of medical devices the Dutch Health Care System is the natural environment where medical devices need to demonstrate their quality. The aim of the course is to acquire knowledge of the Dutch Health Care System from the perspective of medical devices.

Inhoud vak

To be successful in innovation of medical devices one needs knowledge of the 1) Dutch Health Care System, 2) use and users of medical devices, 3) standards and legislation for medical devices, 4) measures of quality of medical devices, and 5) best practice in assurance of quality and safety of medical devices.

Onderwijsvorm

Lectures and working groups.

Toetsvorm

Short written report & oral presentation on a specific medical device.

Literatuur

Reader

Internship Biomolecular Analysis and Spectroscopy

Vakcode	X_432523 (432523)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Internship Biomolecular Analysis and Spectroscopy

Vakcode	X_432524 (432524)
Periode	Ac. Jaar (september)
Credits	24.0

Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex sample using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Internship Biomolecular Analysis and Spectroscopy

Vakcode	X_432525 (432525)
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Internship Communication Specialisation

Vakcode	AM_471148 ()
Periode	Ac. Jaar (september)

Credits	30.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Niveau	600

Doel vak

The internship is a compulsory part of the Master's programme. The aims of the internship are:

- Learn to independently apply and expand your practical science communication skills in one particular area of the field (writing, multi-media, facilitation, policy and strategy development, content design, etc.).
- Critical self-assessment and reflection on acquired science communication competencies in the field.
- Conduct scientific research independently: assess scientific information, design a research project, apply scientific methods, collect data, report and discuss findings.
- Present and discuss about internship and research outcomes.
- Learn to cooperate with researchers and practitioners of various disciplines.
- Gain an impression of a potential future field of career.

Inhoud vak

When you are enrolled in the VU Science Communication specialization or the UvA Major Science Communication you need to conduct one internship (30 ECTS, 5 months). MPA students that choose the Science Communication specialization also need to do at least one internship (30 ECTS, 5months) in the Science Communication field. The internship has two possible formats: the full Research Internship and the Reflective Practice Placement (RPP). The complete and up-to-date information about the internship can be found in the SC internship guide line on blackboard (science communication community).

Onderwijsvorm

Work placement, under supervision of VU-staff.

Toetsvorm

Within six weeks after the start of the internship a Go/No Go evaluation is made by the VU supervisor. The aim of this interim evaluation is to decide whether the project and the student both have enough potential to continue (Go) or not (No Go). This evaluation is based on:

- Written material by the student, including a final research proposal and either the Introduction or Methods section of the article or both.
- Attitude of the student and execution of the project during the initial stage.

The final assessment of the internship is undertaken by the VU-supervisor and the second assessor.

In the final assessment, the VU supervisor assesses four different aspects of the internship:

- the attitude of the student
- the execution of the reflective practice placement
- the final report/article
- the oral presentation

The second assessor provides an assessment of the final report only.

The final report counts for 50% of the final grade, the oral presentation for 25% and the execution of the research also for 25%. Only if marks for each item given by the VU-supervisor and the second assessor are 6 or higher and the attitude is a 'pass', the internship is regarded as sufficient. The final grade is calculated from the marks given by both assessors and, together with other administrative details, is summarized in the final assessment form, done by the master's coordinator.

Vereiste voorkennis

The student is enrolled in the Master's programme Biology of which the internship is part.

The student has passed the following courses:

AM_470582, Qualitative and Quantitative Research Methods

AM_470587, Science and Communication

And the student has acquired 6EC of the following courses:

AM_470572, 6EC, Communication, Organization and Management

AM_1002, 6EC, Science in Dialogue

AM_471014, 6EC, Science Journalism

AM_470590, 6EC, Science Museology

The second internship can only start after the first internship has been fully completed.

Doelgroep

Students from the MSc Biology to specialize in Communication

Intekenprocedure

The research proposal is approved by the placement coordinator and the VU-supervisor, after which the application has to be approved by the masters' coordinator in advance (on behalf of the examination board).

The Placement Manual describes the process of completing the internship from the beginning (the admission) through the actual execution with its supervision to the final stage (assessment and grading) in consecutive order. The various stages of the process will be supported by forms which are supplied in the appendices or in links. Please see the placement manual on Blackboard (ALW_BMW_9999_01: Master Programmes Biomedical Sciences and Biology).

Overige informatie

The Placement Manual is based upon the 'Student Placement (Internship) and Research Project Regulations' of the Faculty of Earth and Life Sciences (FALW). Detailed information can be found in the Placement manual Biology on Blackboard (ALW_BMW_9999_01: Master Programmes Biomedical Sciences and Biology) and in the Academic and Examination Regulations (AER).

Internship Organic Chemistry

Vakcode	X_432529 (432529)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen

Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	500

Doel vak

To obtain experience in doing scientific research in an industrial setting.

Inhoud vak

During a traineeship, a student actively participates in a research project within a company

Toetsvorm

presentation, report and practical work

Overige informatie

Period: variable

Internship Organic Chemistry

Vakcode	X_432530 (432530)
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	500

Doel vak

To obtain experience in doing scientific research in an industrial setting.

Inhoud vak

during a traineeship, a student actively participates in a research project within a company

Toetsvorm

presentation, report and practical work

Overige informatie

Period: variable

Internship Organic Chemistry

Vakcode	X_432531 (432531)
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg

Niveau	500
---------------	-----

Doel vak

during a traineeship, a student actively participates in a research project within a company

Inhoud vak

during a traineeship, a student actively participates in a research project within a company

Toetsvorm

presentation, report and practical work

Overige informatie

Period: variable

Internship Societal Specialisation

Vakcode	AM_471147 ()
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. R.J. van Belle-van den Berg
Examinator	dr. R.J. van Belle-van den Berg
Niveau	600

Internship Theoretical Chemistry

Vakcode	X_432532 (432532)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Toetsvorm

presentation, report, practical work

Doelgroep

MSP and MDSC track

Overige informatie

Period: variable

Internship Theoretical Chemistry

Vakcode	X_432533 (432533)
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical chemistry and computational techniques and doing scientific research.

Toetsvorm

presentation, report and practical work

Overige informatie

Period: variable

Internship Theoretical Chemistry

Vakcode	X_432534 (432534)
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Toetsvorm

presentation, report, practical work

Overige informatie

Period: variable

Lasers and Quantum Optics

Vakcode	X_422539 (422539)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen

Coördinator	dr. W. Vassen
Examinator	dr. W. Vassen
Docent(en)	dr. W. Vassen
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

To provide insight into the theory of light, light-matter interactions and lasers.

Inhoud vak

- Classical Optics (Maxwell's equations, diffraction and interference)
- Nonlinear Optics
- First- and second order coherence
- Radiative transitions in atoms, Einstein coefficients, transition rates, width of spectral lines
- Lasers
- Photon statistics, shot noise
- Photon antibunching
- Coherent states
- Photon number states
- Atom-photon interactions; density matrix, Rabi oscillations, Bloch sphere
- Laser cooling and trapping

Onderwijsvorm

Lectures, exercises.

Toetsvorm

Written exam.

Literatuur

Mark Fox, Quantum Optics (Oxford university Press 2006).

Doelgroep

mMNS-PoL, mPhys-AMEP, mPhys-PLH, mCh-MSP

Literature Study and Research Proposal Chemistry - AS - MSP

Vakcode	X_432800 ()
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
(r.v.a.orr@vu.nl)

Literature Study and Research Proposal Chemistry, MDSC - AS

Vakcode	X_432801 ()
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
r.v.a.orr@vu.nl

Literature Study and Research Proposal Chemistry, MDSC - MSP

Vakcode	X_432802 ()
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
r.v.a.orr@vu.nl

Literature Thesis and Colloquium Chemistry - Organic Chemistry

Vakcode	X_432583 (432583)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Inhoud vak

the student can choose from a wide variety of topics in main group chemistry, organometallic chemistry and catalysis

Toetsvorm

report and presentation

Doelgroep

mCH-MDSC

Literature Thesis and Colloquium Chemistry - Physical Chemistry

Vakcode	X_432582 (432582)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Overige informatie

Contact master coordinator: C.FonsecaGuerra@vu.nl

Literature Thesis and Colloquium Chemistry - Theoretical Chemistry

Vakcode	X_432584 (432584)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Overige informatie

Contact master coordinator: C.FonsecaGuerra@vu.nl

Literature thesis and Colloquium Chemistry Molecular Simulation and Photonics

Vakcode	X_432679 (432679)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Overige informatie

Period: variable

Contact master coordinator: C.FonsecaGuerra@vu.nl

Literature Thesis SES

Vakcode	X_432785 ()
Periode	Ac. Jaar (september)

Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Toetsvorm

report and presentation

Doelgroep

mCH-SES, mPhys-SES

Major research Project Chemistry, AS - MSP

Vakcode	X_432803 ()
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
r.v.a.orr@vu.nl

Major research Project Chemistry, MDSC - AS

Vakcode	X_432804 ()
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
r.v.a.orr@vu.nl

Major research Project Chemistry, MDSC - MSP

Vakcode	X_432805 ()
Periode	Ac. Jaar (september)
Credits	42.0

Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the director of this programme prof Romano VA Orru
(r.v.a.orr@vu.nl)

Management of Sustainable Innovation

Vakcode	X_432739 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. R.J.A. Klein Woolthuis
Examinator	dr. R.J.A. Klein Woolthuis
Docent(en)	dr. R.J.A. Klein Woolthuis
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

Sustainable innovation is crucial to counter the challenges our societies are facing: energy without CO2 emissions, access to water and food, reliable banks, affordable elderly care, climate resilient cities. All fields require a structural rethink of existing systems, and introduction of new products, services, and structures to make a sustainable future possible.

This course has the objective to:

1. Increase awareness of the importance sustainability for future business professionals
2. Increase understanding of how companies, public and government are interrelated in addressing and solving sustainability issues
3. Explore how sustainable innovation can be managed

This last learning goal has to be made explicit in the assignment.

Inhoud vak

This course provides a management concept for sustainable innovation management in commercial and governmental organizations. It provides answers to the question how people, teams, projects, companies and governments can create value and competitive advantage by adopting sustainability as a key driver for their innovation processes.

A paradigm shift is happening at this moment. Where over the past decades firms were focused on creating shareholder value, the creation of 'shared value' is now gaining terrain: leading management scholars like Peter Senge and Michael Porter are describing how companies from Nike to Tesco create value by including all stakeholders in their firm's strategies. New strategies are centered around respect for the

environment, employees, and other stakeholders as to create positive self-reinforcing cycles of value creation. This requires fundamentally different management models in which collaboration with a wide array of stakeholders in key.

Sustainability is hence no longer a story of wishful thinking or environmental activists, it is at the core of corporate strategy and decision making. Moreover, growth in sustainable markets as renewable energy, organic food, and e.g. fair trade products is double digit year after year. Sustainability is not a fashion or an attempt of firms to 'look good', empirical evidence suggest that proper sustainability management improves firm performance and creates new entrepreneurial opportunities in rapidly growing markets. One only has to think of the successes of the Body Shop, Ben and Jerry's and Fair Trade coffee and chocolate.

Onderwijsvorm

Two days a week. One for the tutorial and one to discuss theory and the assignments in small groups.

Assignment:

Students write a strategic business plan for an existing sustainable innovation with an existing firm, e.g. solar panels of BP, the e-player of Sony, or the hybrid cars of Toyota.

In the assignment students use the literature offered in the course to assess the 'quality' of the management of sustainable innovation of these firms. What could these firms improve if they would make use of insights from theory? And what would hence be your advice to these companies at the end of the day?

Toetsvorm

The final grade of the course is determined by the research assignment and a written exam. To pass the course, students must at least score 5.0 for both the assignment and the exam, and score an average of at least 5.5. The research assignment (25%) and written exam (75%) determine the end grade

Literatuur

Bossink, B.A.G. (2012) Eco-innovation and Sustainability Management. New York: Routledge, pp. 182.

Senge, Peter M., Bryan Smith, Nina Kruschwitz, Joe Laur, Sara Schley, 2008, The Necessary Revolution: How Individuals and Organizations Are Working Together to Create a Sustainable World, Doubleday.

Several articles which will be placed on Blackboard.

Managing Science and Technology in Society

Vakcode	AM_470586 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. T.J. Schuitmaker-Warnaar

Examinator	dr. T.J. Schuitmaker-Warnaar
Docent(en)	dr. B.J. Regeer, dr. J.F.H. Kupper, dr. C.W.M. Dedding, dr. T.J. Schuitmaker-Warnaar, prof. dr. J.E.W. Broerse
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	600

Doel vak

In this course, students:

- acquire knowledge and understanding of philosophical and social science theories on science and technology development.
- gain insight into the mutual shaping of science & technology and society.
- acquire knowledge and understanding of the basic concepts and issues in the field of science and technology studies.
- acquire knowledge and understanding of technological development through Responsible Research and Innovation
- acquire knowledge and understanding of interactive methods for directing and guiding developments in science and technology.
- gain insight into the need for democratization of science and technology.
- learn to recognize and operate the central STS concepts in their own life worlds.
- learn to communicate verbally and in scientific writing about their knowledge and understanding and to critically reflect on that.

Inhoud vak

The 'Managing Science and Technology in Society' course offers an advanced introduction into the academic field of 'Science Technology & Society Studies'.

As an MPA student you are trained to operate at the interface of your natural science discipline and society, thereby making a contribution to answering the complex social problems arising in these areas. At the dawn of the 21st century, technology and science have an enormous potential for transforming life on earth. At the same time, the dimensions of our human culture shape the directions in which science and technology develop. The production of scientific knowledge and technological artefacts can solve some of our problems, but at the same time they give rise to new problems. During this course you will study the interactions of science and technology with society, and the various ways in which they mutually shape one another. These interactions invoke a lot of questions. Should we embrace genetically modified food? How do new human reproductive technologies interfere with the way we deal with sexuality and social responsibilities?

In this course you will get acquainted with a conceptual framework to critically assess these kinds of questions. It aims at understanding the intertwinement of science, technology and society, and the importance of a broad concern with these interactions, in order to shape our future in the way that we want it.

Onderwijsvorm

'Managing Science and Technology in Society' is a fulltime course of four weeks (6 ECTS). The course schedule is available on blackboard. The total study time is 168 hours. Tuition methods include lectures, work groups, a group project and self-study.

The different elements have the following study time:

- lectures 22 hours

- work groups 12 hours
- group project 32 hours
- self study (including mini-essays) 88 hours
- examination (take-home) 14 hours

Toetsvorm

The examination consists of:

- Mini-essay 1 (20%)
- Mini-essay 2 (20%)
- Final essay (take-home essay exam) (40%)
- SCOB-project (20%)

Literatuur

The literature of this course consists of selected chapters from the book *An introduction to science and technology studies*, Sergio Sismondo 2010, which can be purchased at the VU book shop. Complementary articles are provided for via blackboard, august 2014.

Doelgroep

Compulsory course within the second year of the Master Management, Policy Analysis and Entrepreneurship for the Health and Life Sciences (MPA)

Overige informatie

Guest Lecturers:

- Wouter Mensink (SCP, UvA)
- Harro van Lente (UU)
- Steven Flipse (TU Delft, De Proeffabriek)

and others

More information: T.J.Schuitmaker@vu.nl

Mass Spectrometry

Vakcode	X_435604 (435604)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2014-2015/zoek-vak/vak/229>

Overige informatie

Registration via <https://www.sis.uva.nl> is mandatory 4 weeks before the start of the Semester.

Master Project SfES

Vakcode	X_422593 ()
Periode	Ac. Jaar (september)
Credits	30.0

Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	600

Master Project SfES

Vakcode	X_422594 ()
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.T.M. Kennis
Examinator	dr. J.T.M. Kennis
Niveau	600

Master Project SfES

Vakcode	X_422595 ()
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.T.M. Kennis
Examinator	dr. J.T.M. Kennis
Niveau	600

Master Project SfES

Vakcode	X_422596 ()
Periode	Ac. Jaar (september)
Credits	48.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.T.M. Kennis
Examinator	dr. J.T.M. Kennis
Niveau	600

Master Project SfES

Vakcode	X_422597 ()
Periode	Ac. Jaar (september)
Credits	54.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen

Coördinator	dr. J.T.M. Kennis
Examinator	dr. J.T.M. Kennis
Niveau	600

Master Research Project Biomol. Analysis and Spectr.

Vakcode	X_432594 (432594)
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	600

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex sample using LC-MS and bio-assay_MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Master Research Project Biomol. Analysis and Spectr. ext

Vakcode	X_432595 (432595)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	600

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct,

analyses and interpretation of complex analytical studies.

Doelgroep

mCh.

Overige informatie

For further information please contact Henk Lingeman.

Master Research Project Biomol. Analysis and Spectr. ext

Vakcode	X_432637 (432637)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	600

Doel vak

To acquire knowledge and insight into the role and objective of drug, bioanalytical and clinical development processes in complex sample using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh.

Overige informatie

For further information please contact Henk Lingeman.

Master Research Project Biomol. Analysis and Spectr. ext

Vakcode	X_432680 (432680)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	600

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS base approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Master Research Project Chemistry - Education Variant

Vakcode	X_432587 (432587)
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Master Research Project Chemistry - Molecular Simulation and Photonics

Vakcode	X_432681 (432681)
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Overige informatie

Period: variable

Contact master coordinator: C.FonsecaGuerra@vu.nl

Master Research Project Chemistry - Organic Chemistry

Vakcode	X_432598 (432598)
Periode	Ac. Jaar (september)
Credits	42.0
Voertaal	Engels

Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Doel vak

To obtain experience in organic chemistry techniques and doing scientific research.

Inhoud vak

the student can choose from a wide variety of research projects in main group chemistry, organometallic chemistry and catalysis

Toetsvorm

presentation, report, practical work

Doelgroep

mCH-MDSC

Master Research Project Chemistry - Organic Chemistry - Extension

Vakcode	X_432618 (432618)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Master Research Project Chemistry - Organic Chemistry - Extension

Vakcode	X_432599 (432599)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Doel vak

To obtain experience in organic chemistry techniques and doing scientific research.

Inhoud vak

the student can choose from a wide variety of research projects in main group chemistry, organometallic chemistry and catalysis

Toetsvorm

presentation, report and practical work

Doelgroep

mCH-MDSC

Master Research Project Chemistry - Organic Chemistry - Extension

Vakcode	X_432685 (432685)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	600

Overige informatie

Period: variable

Master Research Project Chemistry - Society Oriented Variant

Vakcode	X_432588 (432588)
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Master Research Project Chemistry Molecular Simulation and Photonics - Extension

Vakcode	X_432682 (432682)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Overige informatie

Period: variable

Contact master coordinator: C.FonsecaGuerra@vu.nl

Master Research Project Chemistry Molecular Simulation and Photonics - Extension

Vakcode	X_432683 (432683)
Periode	Ac. Jaar (september)
Credits	12.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Overige informatie

Period: variable

Contact master coordinator: C.FonsecaGuerra@vu.nl

Master Research Project Chemistry Molecular Simulation and Photonics - Extension

Vakcode	X_432684 (432684)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	600

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Overige informatie

Period: variable

Contact master coordinator: C.FonsecaGuerra@vu.nl

Master Research Project Communication Variant

Vakcode	X_432586 (432586)
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen

Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	600

Doel vak

please contact the mastercoordinator of your track

Minor research project Analytical Sciences

Vakcode	X_437031 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	500

Doel vak

please contact the director of this programme prof Romano VA Orru

(r.v.a.orr@vu.nl)

Overige informatie

Attendance at HRSCM symposium is obligatory

Minor Research Project Biomol. Analysis and Spectr.

Vakcode	X_432649 (432649)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Minor Research Project Biomol. Analysis and Spectr.

Vakcode	X_432650 (432650)
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

mCh

Overige informatie

For further information please contact Henk Lingeman.

Minor Research Project Biomol. Analysis and Spectr.

Vakcode	X_432651 (432651)
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Niveau	500

Doel vak

To acquire knowledge and insight into the role and objective of drug, bio-analytical and clinical development processes in complex samples using LC-MS and bio-assay-MS based approaches.

Inhoud vak

This project aims to provide the student with a theoretical and practical understanding of the issues involved in the design, conduct, analyses and interpretation of complex analytical studies.

Doelgroep

Overige informatie

For further information please contact Henk Lingeman.

Minor research project Design and Synthesis

Vakcode	X_437033 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	500

Doel vak

please contact the director of this programme prof Romano VA Orru
(r.v.a.orr@vu.nl)

Overige informatie

Attendance at HRSCM symposium is obligatory

Minor research project Molecular Simulation and Photonics

Vakcode	X_437035 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	500

Doel vak

please contact the director of this programme prof Romano VA Orru
(r.v.a.orr@vu.nl)

Overige informatie

Attendance at HRSCM symposium is obligatory

Minor Research Project Organic Chemistry

Vakcode	X_432640 (432640)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	500

Doel vak

To obtain experience in organic chemistry techniques and doing scientific research.

Inhoud vak

the student can choose from a wide variety of research projects in main group chemistry, organometallic chemistry and catalysis

Toetsvorm

presentation, report and practical work

Minor Research Project Organic Chemistry

Vakcode	X_432641 (432641)
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	500

Doel vak

To obtain experience in organic chemistry techniques and doing scientific research.

Inhoud vak

the student can choose from a wide variety of research projects in main group chemistry, organometallic chemistry and catalysis

Toetsvorm

presentation, report and practical work

Minor Research Project Organic Chemistry

Vakcode	X_432642 (432642)
Periode	Ac. Jaar (september)
Credits	30.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Niveau	500

Doel vak

To obtain experience in organic chemistry techniques and doing scientific research.

Minor Research Project Theoretical Chemistry

Vakcode	X_432646 (432646)
Periode	Ac. Jaar (september)
Credits	18.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Aanbevolen voorkennis

Computational (Pharmaco) Chemistry

Doelgroep

Master Chemistry and DDS

Overige informatie

Period: variable

Minor Research Project Theoretical Chemistry

Vakcode	X_432647 (432647)
Periode	Ac. Jaar (september)
Credits	24.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Aanbevolen voorkennis

Computational (Pharmaco) Chemistry

Doelgroep

mCH and mDDS

Overige informatie

Period: variable

Minor Research Project Theoretical Chemistry

Vakcode	X_432648 (432648)
Periode	Ac. Jaar (september)
Credits	30.0

Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. C. Fonseca Guerra
Examinator	dr. C. Fonseca Guerra
Niveau	500

Doel vak

To obtain experience in theoretical and computational chemistry techniques and doing scientific research.

Aanbevolen voorkennis

Computational (Pharmaco) Chemistry

Doelgroep

mCH: MSP and MDSC track

Overige informatie

Period: variable

Modern Quantum Chemistry

Vakcode	X_432807 ()
Periode	Periode 4+5+6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	500

Doel vak

For information please contact Prof. Lies Bouwman@lic.leidenuniv.nl

Molecular Computational Chemistry

Vakcode	X_435666 (435666)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. F.M. Bickelhaupt
Examinator	prof. dr. F.M. Bickelhaupt
Docent(en)	prof. dr. F.M. Bickelhaupt, dr. C. Fonseca Guerra
Lesmethode(n)	Hoorcollege, Practicum
Niveau	400

Doel vak

To learn the background of modern computational methods and in particular their application in computer-assisted solving of chemical problems.

Inhoud vak

Computational chemistry plays a central role in modern chemical research. Various molecular properties can be computed with chemical accuracy. In this way, information can be obtained about quantities that are experimentally inaccessible yet indispensable for molecular design and synthesis. One of the main objectives of this course is to learn current state-of-the-art quantum chemical methods and computer software. This course deals with ab initio theory (among others, Hartree-Fock and Møller-Plesset theory) and modern density functional theory (DFT).

These methods are applied in a computer lab in order to get acquainted with important modeling skills, such as, geometry optimization (molecular structure, stability, and thermochemistry) and the exploration of potential energy surfaces (kinetics, reaction mechanism).

A second main objective is to develop skills for casting an (experimental) chemical problem into a computational approach leading to a practical solution. Furthermore, the course provides an introduction into creating physical models that help interpreting experimental as well as computational data. An important issue in this course is the unifying power of computational chemistry: the same theoretical models serve as tools for solving very diverse problems from all branches of chemistry, ranging from organic chemistry and catalysis via biochemistry till pharmaceutical sciences.

Onderwijsvorm

Theory classes and hands-on computer lab as well as short research project.

Toetsvorm

Presentation of research project for peers and supervisors.

Literatuur

Jensen, F.
Introduction to Computational Chemistry, 2nd Ed.,
Wiley, 2007.

Aanbevolen voorkennis

BSc Scheikunde of BSc Farmaceutische Wetenschappen

Doelgroep

mCh, mDDS

Molecular Photodynamics

Vakcode	X_432701 (432701)
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. M.H.M. Janssen
Examinator	prof. dr. M.H.M. Janssen
Niveau	500

Doel vak

The objective of this course is to make students familiar with detailed chemical dynamics in chemical processes. In particular the importance of photochemical bondbreaking and atmospheric (troposphere and stratosphere) photochemistry will be presented. The role of fundamental physical forces that determine the dynamics and energetics of chemical bondbreaking will be discussed. The students will learn about the latest state-of-the-art experimental technology to follow a chemical reaction in real time. In particular lasers and their phenomenal potential in chemical research will be discussed.

Inhoud vak

We will discuss the role of forces and the Born-Oppenheimer potential in chemical bondbreaking. Photochemistry, energetics and angular properties of molecules and chemical reactions will be presented. Photons, light, lasers and their potential for the study of chemical reactions and applications in various areas of chemistry will be discussed. Laser spectroscopy, atmospheric chemistry, global warming and the role of greenhouse gasses will be discussed. State-of-the-art developments in physical chemistry like the mass-spectrometric detection of chiral molecules by femtosecond laser technology and three-dimensional particle imaging will be presented.

Toetsvorm

To be determined in consultation with the student.

Literatuur

To be determined in consultation with the lecturer.

Doelgroep

Students interested in state-of-the-art developments in physical chemistry and laser spectroscopy.

Overige informatie

Period: in consultation with the lecturer.

Molecular Photodynamics

Vakcode	X_432702 (432702)
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. M.H.M. Janssen
Examinator	prof. dr. M.H.M. Janssen
Niveau	500

Doel vak

The objective of this course is to make students familiar with detailed chemical dynamics in chemical processes. In particular the importance of photochemical bondbreaking and atmospheric (troposphere and stratosphere) photochemistry will be presented. The role of fundamental physical forces that determine the dynamics and energetics of chemical bondbreaking will be discussed. The students will learn about the latest

state-of-the-art experimental technology to follow a chemical reaction in real time. In particular lasers and their phenomenal potential in chemical research will be discussed.

Inhoud vak

We will discuss the role of forces and the Born-Oppenheimer potential in chemical bondbreaking. Photochemistry, energetics and angular properties of molecules and chemical reactions will be presented. Photons, light, lasers and their potential for the study of chemical reactions and applications in various areas of chemistry will be discussed. Laser spectroscopy, atmospheric chemistry, global warming and the role of greenhouse gasses will be discussed. State-of-the-art developments in physical chemistry like the mass-spectrometric detection of chiral molecules by femtosecond laser technology and three-dimensional particle imaging will be presented.

Toetsvorm

To be determined in consultation with the student.

Literatuur

To be determined in consultation with the lecturer.

Doelgroep

Students interested in state-of-the-art developments in physical chemistry and laser spectroscopy.

Overige informatie

Period: in consultation with the lecturer

Networked Organizations and Communication

Vakcode	S_NOC ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Sociale Wetenschappen
Lesmethode(n)	Hoorcollege, Practicum, Werkgroep
Niveau	500

Doel vak

Students who have completed the seminar will be able to critically approach, interpret, and compare theories and literature on social networks, semantic networks, and networked organizations. They can write a literature review or essay about the developing field of networked organizations and communication. Moreover, they can carry out a small-scale research project (in groups) using a software tool ORA/Automap to conduct social and semantic network analysis on text documents.

Inhoud vak

The seminar Networked Organizations and Communication aims at gaining in-depth insight into networks and network analysis. The seminar begins with an introduction to network theory, general terms, and concepts. On the basis of recent network literature, the seminar then focuses on how organizations and organizational members become more connected to each other (e.g., through actor similarity, communication patterns, etc.). A particular focus will thus be on gaining insights into social and

semantic networks and on the software program with which one can analyze and visualize social or semantic networks. This course addresses three aspects of organizational networks: structure, content and meaning.

Onderwijsvorm

Lectures combined with workshops about two different network analysis methods. Active participation in the lectures and method workshops is required.

Toetsvorm

Possibly small tests during class, individual literature review, group assignment (research project), and group presentations.

Literatuur

Series of articles to be announced on Blackboard.

Vereiste voorkennis

All students are recommended to study chapters 1, 2, 3, 7, and 10 of Kadushi, C., 2012: Understanding social networks. Oxford University Press: New York.

Aanbevolen voorkennis

All students are recommended to study chapters 1, 2, 3, 7, and 10 of Kadushi, C., 2012: Understanding social networks. Oxford University Press: New York.

Non-BCO student who cannot participate in Organization Sciences (S_OS) are strongly recommended to study the literature of this course.

Doelgroep

MSc BCO track Strategie en identiteit, exchange students, and students SBI.

Nuclear Magnetic Resonance

Vakcode	X_435667 (435667)
Periode	Periode 4
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	500

Inhoud vak

<http://studiegids.uva.nl/xmlpages/page/2014-2015/zoek-vak/vak/8235>

Doelgroep

mCh

Intekenprocedure

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Numerical Techniques

Vakcode	X_420082 (420082)
----------------	-------------------

Periode	Periode 4+5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	I.P.H. Dubbeldam MA
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course description is available on <http://studiegids.uva.nl/web/uva/sgs/nl/c/220.html>

Doelgroep

mCh-MSP

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Omics-procedures in molecular clinical Diagnostics

Vakcode	X_432766 ()
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Docent(en)	dr. H. Lingeman
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

The primary objective of this course is highlighting the various omics-approaches that are used in drug- and biomarker discovery.

Inhoud vak

Omic-approaches involve the comparison of metabolomes, proteomes and genomes between control and test groups to find differences in their profiles. Those differences may be correlated to the disease being studied in clinical biomarker discovery or changes in the metabolic output in toxicology studies. During the course the fundamentals and applications of omic-based techniques will be discussed. The focus will be on the separation (e.g. chromatography, electrophoresis), detection/identification (e.g. MS, NMR, Spectroscopic) and chemometric procedures to unravel complex biological and clinical samples

Onderwijsvorm

Lectures and projects

Literatuur

Hands-outs (electronically available)

Doelgroep

mCH-AS, mDDS, mMNS

Overige informatie

X_432733 vervalt en is vervangen door X_432766

Open Innovation in Science

Vakcode	X_430583 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	drs. P. van Hoorn
Examinator	drs. P. van Hoorn
Docent(en)	prof. dr. ir. B.A.G. Bossink, drs. P. van Hoorn
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

In this final course in the Business and Innovation course series across the Bachelor SBI program, the challenges involved in 'Open Innovation' (OI) are the central theme. Classes cover the dominant OI theoretical insights and crucial aspects of OI based on various pieces of literature, a book and casework on the subject.

Students will gain insight in the emergence, distribution, application and marketing of scientific knowledge in a complex network of stakeholders. Through the case work assignments, teams will learn to apply OI principles and aim to take on inherent OI challenges in transitions that are taking place in both the Energy and Life sciences sectors.

Inhoud vak

1. Theories, trends and practice of OI through literature study which also will be presented and discussed in class. These materials are the subject of a final written exam.

2. Assignments based on actual cases, including Harvard Cases.

In this course two cases will be presented with the purpose of demonstrating the dilemma's that open innovation practices inevitably lead to. And to subsequently apply the theoretical OI principles to both cases through executing a team assignment.

Case A: Vertex and the CF Foundation have developed a novel drug. The R&D trajectory breaks the mold of the fully-integrated pharma approach to development through aspects like: advocacy group financing of research, end-user driven innovation, ownership position of developers, R&D within a heterogeneous network and last but not least, patient benefit as the primary driver. (two Harvard cases: a: Vertex and b: Bob Beale and the CFF)

Case B: Alliander, an energy supply and network company drives an international network of innovator start-ups collectively playing in the smart grid space. Also here, the setting provides many challenges that test the OI framework.

Onderwijsvorm

Lectures, guest lectures, casework en reports

Toetsvorm

The final course grade is composed of a grade on casework per team (50%) and individual written exam (50%).

The assignment outputs include a final report and a presentation.

Literatuur

Open Innovation, Researching a New Paradigm. Edited by Henry Chesbrough et al. 2008 - Oxford University Press, first published in 2006. NOTE: a book by Tidd (Sussex) that was issued in 2014 is considered for this course to replace Chesbrough.

Higgins et al (2007) - Vertex Pharmaceuticals and the CF Foundation: Venture Philantropy Funding for Biotech, 2007 by Harvard Business School
Kaplan et al – Bob Beall at the CF Foundation (2009) by Harvard Business School.

Vereiste voorkennis

Natural sciences courses, including Physics and (Bio)Chemistry (level 100) as well as basics in Innovation sciences

Aanbevolen voorkennis

SBI Students taking OlinS, are expected to have completed: IW for SBI1, O&I for SBI2 or similar as well as the 4 preceding Innovation Projects. Having attended Technology & Innovation will be a great benefit to students taking OI in S.

Doelgroep

3 B SBI. OI in S is part of the broad SBI Minor for Science students. Non SBI Bachelor students enrolled may be requested to study additional preparatory literature, preceding execution of the group assignment.

Overige informatie

Should you have any questions about this course, please send an Email to <p.van.hoorn@vu.nl>

Organic Photovoltaics

Vakcode	X_422590 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. E.L. von Hauff
Examinator	dr. E.L. von Hauff
Docent(en)	dr. E.L. von Hauff
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course is comprised of three main topics:

- Properties of organic semiconductors – organic semiconductors possess semiconducting attributes due to their unique electronic

structure. The optical, electrical and structural properties, as well as fabrication and characterisation techniques will be introduced.

- Photovoltaic energy conversion – photovoltaic energy conversion is based on the absorption of light, the separation and transport of charge carriers, the collection of photocurrent. These processes will be discussed in terms of the material properties of organic semiconductors.
- Current research questions in organic photovoltaics – charge carrier separation and transport is a unique problem in organic semiconductors. Correlations between material properties and solar cell efficiency will be established.

Onderwijsvorm

Introductory lectures for each module (with homework). Workshop-style student presentations dealing with research articles.

Toetsvorm

Student-presentations during the lectures

Doelgroep

mPhy

mCh

Part of track Science for Energy and Sustainability

Organische Chemie voor HLO AS

Vakcode	X_437587 ()
Periode	Periode 1
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/web/uva/sgs/nl/c/14347.html>

Overige informatie

Opgave via <https://www.sis.uva.nl> tot 4 weken voor aanvang van het semester is verplicht

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Organische chemie voor HLO-instroom

Vakcode	X_430519 (430519)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. E. Ruijter
Examinator	dr. E. Ruijter
Docent(en)	dr. E. Ruijter
Lesmethode(n)	Hoorcollege

Niveau	400
---------------	-----

Doel vak

De student:

- kan aan de hand van de moleculaire structuur van natuurstoffen de globale biosynthetische route herleiden;
- kent de principes van de chemisch synthetische routes van biopolymeren en deze vergelijken met de biochemische synthese.

Inhoud vak

Biosynthese van primaire metabolieten zoals monosacchariden, aminozuren en DNA/RNA-basen alsmede de daaruit afgeleide biopolymeren te weten polysacchariden, eiwitten en peptides en nucleïnezuren. Chemische synthese van biopolymeren en de rol hiervan in de moderne life sciences. Bouwstenen en principes secundair metabolisme. Chemische hypothese 'origin of life' vraagstuk en 'RNA World' theorie.

Onderwijsvorm

Hoorcollege.

Toetsvorm

schriftelijk tentamen

Doelgroep

HLO-instroom in MSc-Chemistry tracks:
Analytical Sciences;
Molecular Design Synthesis & Catalysis

Overige informatie

Student schrijft zich in voor Organische Chemie voor HLO-instroom (X_430519), en volgt Synthese in de Natuur (X_430610).
Cijfer komt te staan bij Organische Chemie voor HLO-instroom (X_430519)

Organometallic Chemistry and Homogenous Catalysis

Vakcode	X_432808 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	500

Doel vak

voor meer informatie neem contact op met Prof. Lies
Bouwman@lic.leidenuniv.nl

<https://masters.lic.leidenuniv.nl/courses/2013-2014/mhc>

Inhoud vak

Universiteit Leiden

Photosynthesis and Energy

Vakcode	X_422553 (422553)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. R. van Grondelle
Docent(en)	prof. dr. R. van Grondelle
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Introduce the fundamental aspects of photosynthesis and photosynthetic energy conversion.

Inhoud vak

Photosynthesis: an overview of the biological process
 The relevant structures: pigments, proteins, the photosynthetic membrane
 Excitation energy transfer and excitons
 Disorder Charge separation by the reaction center and electron transfer
 Charge stabilisation Proton coupled electron transfer
 The energetics of photosynthesis
 Artificial photosynthesis

Onderwijsvorm

Lectures, literature study, presentations

Toetsvorm

Scriptie plus presentation of subject related to photosynthesis.

Literatuur

Blankenship, R.E., Molecular Mechanisms of Photosynthesis. Blackwell 2002.

Doelgroep

mPhys-PLH, mPhys-AMEP, mCH-SES, mPhys-SES

Physical-Organic Chemistry

Vakcode	X_435663 (435663)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

Survey of structural features, reaction mechanisms, and physical organic concepts needed in organic chemistry.

Inhoud vak

Advanced organic chemistry course centered around chemical bonding, stereochemical principles, conformational and stereo-electronic effects, isotope effects, reaction mechanisms, nucleophilic

substitutions, eliminations, aromaticity, carbocations, carbanions, radicals, pericyclic reactions, and acid-base catalysis. These structural and mechanistic concepts are essential in organic synthesis.

Onderwijsvorm

Lectures and tutorials with homework

Toetsvorm

Written or oral examination and assignments.

Literatuur

Anslyn, E.V., and Duggerty, D.A., Modern Physical Organic Chemistry. University Science Books, 2006.

Vereiste voorkennis

BSc

Aanbevolen voorkennis

BSc S, BSc F

Doelgroep

mCh, mF

Policy, Politics and Participation

Vakcode	AM_470589 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	C.A.C.M. Pittens MSc
Examinator	C.A.C.M. Pittens MSc
Docent(en)	dr. B.J. Regeer, dr. J.F.H. Kupper, prof. dr. J.E.W. Broerse
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

To further deepen your analytic skills with respect to the assessment of a specific societal problem;

To acquire further insight into the practice of interactive research;

To acquire further insights into specific methods and techniques of interactive research;

To strengthen the skills to design an interactive research project

To practice skills in data collection and analysis;

To learn to set up valid lines of argumentation;

To improve your communication skills;

To improve your skills in working effectively in a project team, through team building, team analysis and feedback.

Inhoud vak

In this course you get the chance to gain experience in the practical implementation of methodologies for interactive research. In a four week policy project you will both improve your focus group research skills and deepen your understanding of the relevant theoretical concepts in

the areas of policy studies, science and technology studies and democracy theory. In a group of about ten students you will participate in a real interactive research project which is executed at the Athena institute. In this project you will be trained in and practice various skills for data collection (such as focus group design and facilitation) and data analysis (such as qualitative content analysis).

Specific attention is paid to your personal interactive research skills. At the end of the course, you prepare a policy report to present your findings. In an oral presentation your team will highlight the main results of your analysis and defend the recommendations you propose.

Onderwijsvorm

Total course 6 EC = 160 hours

lectures 14 hours

training workshops 4 hours,

project assignment 102 hours

focus group execution 3 hours

Self study 33 hours

final presentations project results: 4 hours

Toetsvorm

The course does not have an oral or written exam. You will be assessed on the basis of the group assignment, a group presentation and on your individual performance during the course (in the work groups, your facilitation skills in the 'real' focus groups). For all parts a pass grade (> 5.5) needs to be obtained in order to receive a final mark.

Your final mark will be based on: the group report (40%): oral presentation per group(40%): individual performance (20%).

Literatuur

To be announced on Blackboard

Vereiste voorkennis

Basic knowledge of (interactive) policy processes, policy analysis and relevant research skills are required.

Doelgroep

Optional course for Master students Management, Policy Analysis and Entrepreneurship in Health and Life sciences (MPA), Societal differentiation of the Health, Life & Natural Sciences.

Intekenprocedure

Registration deadline by VU.net is 4 weeks before the start of the course.

Overige informatie

As the project depends on team work, attendance is compulsory.

Praktijk I

Vakcode	O_MLPRAKI ()
Periode	Periode 1+2+3, Periode 4+5+6
Credits	15.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek

Coördinator	ir. E.J.F. Scheringa
Examinator	ir. E.J.F. Scheringa
Niveau	500

Doel vak

De student maakt kennis met het onderwijs in de praktijk, verzorgt lessen en is betrokken bij andere leerlinggerichte activiteiten. Hij kan binnen de context van de school theoretische inzichten praktisch vormgeven en weet de praktijkomgeving te benutten om aan eigen ontwikkelpunten te werken.

De student werkt samen met anderen binnen en buiten de school en kan zijn functioneren als teamlid beschrijven en toelichten.

Inhoud vak

Het totale aantal klassencontacturen dat een student moet maken tijdens Praktijk 1 en 2, bedraagt tenminste 250. Tijdens deze uren observeert of verzorgt de student lessen en neemt deel aan andere leerlinggerichte activiteiten. Hij/zij geeft tenminste 120 lessen, waarvan minimaal 40 lesuren in de bovenbouw havo/vwo.

De verdeling en fasering van dit aantal uren over Praktijk 1 en 2 wordt in overleg met de begeleider op school bepaald. In Praktijk 1 ligt de nadruk op het observeren en het onder begeleiding voorbereiden, uitvoeren en evalueren van lessen.

Dit opleidingsonderdeel loopt parallel aan vakdidactiek 1 en algemene didactiek en pedagogiek 1, waardoor een goede wisselwerking mogelijk is tussen theorie en praktijk.

Toetsvorm

Praktijk 1 wordt door de schoolbegeleider beoordeeld aan de hand van een checklist. De schoolbegeleider doet daarbij een voorstel dat door de instituutsbegeleider moet worden onderschreven.

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding

Praktijk II

Vakcode	O_MLPRAKII ()
Periode	Periode 1+2+3, Periode 4+5+6
Credits	15.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek
Coördinator	ir. E.J.F. Scheringa
Examinator	ir. E.J.F. Scheringa
Niveau	500

Doel vak

De student kan, als docent-in-opleiding, verantwoordelijkheid dragen voor het zelfstandig voorbereiden, uitvoeren en evalueren van lessen in de onder- en bovenbouw van het Havo/VWO. Hij kan tevens een bijdrage leveren aan schoolbrede activiteiten. Hij kan binnen de context van de

school theoretische inzichten praktisch vormgeven en weet de praktijkomgeving te benutten om aan eigen ontwikkelpunten te werken. Hij kan reflecteren op opgedane ervaringen en verworven inzichten en deze op dusdanige manier beschrijven dat zij inzichtelijk worden voor anderen. De student toont zich professioneel in de samenwerking met anderen binnen en buiten de school en kan zijn functioneren als teamlid beschrijven en toelichten.

Inhoud vak

Het totale aantal klassencontacturen dat een student moet maken tijdens Praktijk 1 en 2, bedraagt tenminste 250. Tijdens deze uren observeert of verzorgt de student lessen en neemt deel aan andere leerlinggerichte activiteiten. Hij/zij geeft tenminste 120 lessen, waarvan minimaal 40 lessen in de bovenbouw havo/vwo.

De verdeling en fasering van dit aantal uren over Praktijk 1 en 2 wordt in overleg met de begeleider op school bepaald. Tijdens Praktijk 2 draagt de student verantwoordelijkheid voor een of meer klassen. Hij bereidt het onderwijs voor, voert het uit en evalueert het. Hij werkt hierbij nadrukkelijk samen met sectiegenoten en andere collega's binnen de school en is zich bewust van de context waarin zijn lessen plaatsvinden. In het portfolio doet hij verslag van zijn functioneren als teamlid en collega in de school.

Dit opleidingsonderdeel loopt parallel aan vakdidactiek 2 en algemene didactiek en pedagogiek 2, waardoor een goede wisselwerking mogelijk is tussen theorie en praktijk.

Toetsvorm

Praktijk 2 wordt door de schoolbegeleider beoordeeld aan de hand van een checklist waarop het eindcijfer voor de praktijk wordt gebaseerd. De schoolbegeleider doet daarbij een voorstel dat door de instituutsbegeleider moet worden onderschreven.

Tevens beoordeelt schoolbegeleider het functioneren van de student als teamlid en collega op basis van de door de student uitgevoerde portfolio-opdrachten.

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding.

Principles of Pharmaceutical Sciences / Pharmacology

Vakcode	X_435675 (435675)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. I.J.P. de Esch
Examinator	prof. dr. I.J.P. de Esch
Docent(en)	prof. dr. I.J.P. de Esch
Lesmethode(n)	Hoorcollege

Niveau	400
---------------	-----

Doel vak

General introduction into and deepening of knowledge of concepts, mechanisms and recent developments in pharmaceutical sciences and the pharmaceutical and biotech industry.

Inhoud vak

This course is designed for students with an interest in life sciences and the biotech/pharmaceutical industry but without prior education in this field. A general introduction will be given to the process of drug discovery, drug design and synthesis, drug development and drug safety assessment. Subsequently, potential drug targets, mechanisms of drug actions (including drug-receptor/enzyme Using various drug classes, relationships between chemical structures and biological activities will be derived and illustrated. Finally, various modern developments and tools will be illustrated by recent applications in the field of drug research, medicinal chemistry and toxicology.

Onderwijsvorm

Lectures and tutorials.

Toetsvorm

Written examination

Literatuur

Patrick, G., An Introduction to Medicinal Chemistry 5th ed.
Oxford: Oxford University Press. 2009, ISBN: 978-0-19-969739-7

Doelgroep

3S, 3MNW, mCh, mPhys.

The course is optional for mDDS students that did not follow the VU University BSc farmaceutische wetenschappen and these mDDS students should contact the mDDS coordinator before enrolling.

The course is recommended for SBI (life) mastertrack students, except for students with a bachelor in SBI or pharmaceutical sciences.

Professionele ontwikkeling en onderzoek I

Vakcode	O_MLVPOOI ()
Periode	Periode 1+2+3, Periode 4+5+6
Credits	3.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek
Docent(en)	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. I. Pauw, drs. W.S. Hoekstra, drs. C.D.P. van Oeveren, drs. S. Donszelmann, drs. S. Attema-Noordewier, drs. W. Jongejan, dr. H.B. Westbroek, dr. E. van den Berg, C.L. Geraedts, drs. A. Krijgsman, prof. dr. J.J. Beishuizen, dr. A.A. Kaal, dr. J.J.M. van Eersel, drs. K.L. Schaap, W. Maas, drs. G.D. van Hummel, F.L. de Vries MSc, drs. H. Stouthart
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Doel vak

De student kan systematische reflecteren op het eigen handelen in de onderwijspraktijk en daardoor richting geven aan de eigen professionele ontwikkeling.

De student kan een onderzoeksvraag formuleren voor een onderzoek aan zijn/haar eigen onderwijspraktijk, deze vraag inbedden in een theoretisch kader en een opzet maken voor de uitvoering van het onderzoek.

Inhoud vak

Dit vak bestaat uit twee delen: een reflectiedeel en een onderzoeksdeel. Het reflectiedeel krijgt vorm en inhoud in zogenaamde peergroepbijeenkomsten. Hierin reflecteert de studenten samen met anderen op zijn/haar handelen in de praktijk en leert daaruit ontwikkelpunten af te leiden, acties te formuleren en deze te evalueren. Verschillende instrumenten en methodes worden gebruikt (logboek, reflectiecirkel, intervisie,...) om de student in staat te stellen de complexiteit van de onderwijspraktijk te doorgronden en hiervan te leren. Daarnaast wordt een start gemaakt met het formuleren van de eigen visie op onderwijs en leren.

In het onderzoeksdeel wordt een opzet gemaakt van een praktijkonderzoek. In dit onderzoek diept de student één of meer vraagstukken uit de (eigen) onderwijspraktijk uit, waarbij een onderzoeksvraag ingebed wordt in een theoretisch kader en op één of enkele scholen empirisch materiaal wordt verzameld. In plenaire bijeenkomsten komen onderwerpen aan de orde als het formuleren van de probleemstelling en de onderzoeksvraag, het verkennen van de literatuur en het verzamelen van de data. Daarnaast kan de student beroep doen op individuele begeleiding rondom zijn/haar onderzoek. Dit alles mondt uit in een eerste onderzoeksformat voor het praktijkonderzoek dat vervolgens in het vak Professionele Ontwikkeling en Onderzoek 2 uitgevoerd, gepresenteerd en geëvalueerd wordt.

Onderwijsvorm

colleges, werkgroepbijeenkomsten en individuele begeleiding van het onderzoek door instituutsbegeleiders.

Toetsvorm

Uitvoeren van opdrachten.

Literatuur

Een literatuurlijst wordt verstrekt aan het begin van de opleiding.

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding.

Overige informatie

Voor alle onderdelen geldt een aanwezigheidsplicht.

Professionele ontwikkeling en onderzoek II

Vakcode	O_MLVPOOII ()
Periode	Periode 1+2+3, Periode 4+5+6
Credits	6.0
Voertaal	Nederlands

Faculteit	Faculteit der Psychologie en Pedagogiek
Coördinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Docent(en)	dr. C.P. van Velzen, drs. W. Jongejan, dr. T. Bosma, dr. H.B. Westbroek, dr. E. van den Berg, dr. A.A. Kaal, dr. J.J.M. van Eersel, dr. A. Handelzalts, W. Maas
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Doel vak

De student kan een praktijkonderzoek opzetten, uitvoeren en hierover rapporteren.

Inhoud vak

Dit vak bestaat uit twee delen: een reflectiedeel en een onderzoeksdeel. Het reflectiedeel krijgt vorm en inhoud in begeleide en zelfstandige intervisiegroepen waarin studenten reflecteren op hun praktijk aan de hand van cases en eigen videobeelden. Daarnaast formuleren de studenten in dit deel hun visie op onderwijs en leren.

In het praktijkonderzoeksdeel diept de student in samenwerking met een medestudent één of meer vraagstukken uit de (eigen) onderwijspraktijk uit. Hij of zij doet dat door het samen opzetten, uitvoeren en evalueren van een op de eigen onderwijspraktijk gericht onderzoek waarbij op één of enkele scholen empirisch materiaal wordt verzameld. Aan de hand van de opzet die deels gemaakt is tijdens de module Professionele Ontwikkeling en Onderzoek 1 en deels in POO 2 ontwerpen studenten onderzoeksinstrumenten om empirisch gegevens te verzamelen voor het beantwoorden van de onderzoeksvraag en voeren zij het onderzoek uit.

Voordat het onderzoeksplan mag worden uitgevoerd, moet het worden goedgekeurd door de eerste en tweede beoordelaar.

In een artikel voor collega docenten rapporteren studenten over het onderzoek waarin aan de orde komen vraagstelling, relevantie, verankering in bestaande theorie, gebruikte instrumenten, data, conclusie en discussie. De studenten presenteren ook hun onderzoek tijdens de Onderwijsresearchdag.

Onderwijsvorm

Onderzoek, verplichte deelname aan hoorcolleges praktijkonderzoek en werkcollege, intervisiebijeenkomsten, individuele begeleiding door instituutsbegeleiders.

Toetsvorm

De rapportage van het praktijkonderzoek vindt plaats in de vorm van een posterpresentatie en een artikel voor een vaktijdschrift voor leraren.

Het artikel wordt gezamenlijk beoordeeld door de eerste begeleider en tweede lezer, die wordt aangezocht door de eerste begeleider. De presentatie van het onderzoek op de Onderwijsresearchdag wordt meegenomen in de eindbeoordeling. Ook de mate van zelfstandigheid in het opzetten, uitvoeren en rapporteren van het onderzoek wordt beoordeeld

Literatuur

Een literatuurlijst wordt verstrekt aan het begin van de opleiding.

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding.

Om dit vak te volgen moet het vak Professionele Ontwikkeling en Onderzoek 1 met goed gevolg zijn afgelegd.

Overige informatie

Voordat het onderzoeksplan mag worden uitgevoerd, moet het worden goedgekeurd door de eerste en tweede beoordelaar.

Voor alle onderdelen geldt een aanwezigheidsplicht.

Project Sustainable Future

Vakcode	X_432784 ()
Periode	Periode 6
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.C. Slootweg
Examinator	dr. J.C. Slootweg
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	500

Inhoud vak

Human civilization finds itself at a pivotal point in history. As a result of the growing world population as well as extensive industrial and societal developments that have taken place over the last 150 years, humanity has exploited earth's natural resources up to a point that further developing or even maintaining current levels of prosperity cannot be sustained. In addition, it has become very clear that current fossil fuel based energy technologies have a dramatic adverse effect on the global climate. These issues becomes even more urgent when considering the anticipated elevated prosperity levels in the developing world.

These developments lie at the basis of the concept of 'sustainability': the future has to be radically different from past and present in the sense that human activities must be carried out in such a way that they can be sustained for many generations. To achieve this, many aspects of human activity have to be changed: different technologies for energy production and resource utilization will have to be developed. Choices will have to be made as of which of these new technologies are considered most favorable for society. Such technologies will have to be implemented at large scale, which requires involvement of decisive societal forces, such as governments, markets, producers and consumers. Only if clear, rational and appealing visions are developed can such societal forces be activated and the required changes be realized.

In this course, we will consider a number of acute sustainability themes that humanity faces today. The students' mission of this course will be to define under which conditions new technologies can make a meaningful contribution to a sustainable future of our society in a specific case

study. The project will be divided in 4 discrete steps:

1. We will analyze the scientific basis of the issue under consideration. We will analyze the potential, but also the limitations of each technology.
2. We will analyze what 'sustainability' actually means. The term is often used in a loose and informal way. But 'sustainability' only becomes meaningful when it is made quantitative! We will apply these concepts to the chosen theme, and define the conditions that are required to make the new technologies deserve the label 'sustainable'.
3. To assess and potentially quantify the uncertainties and risks with regard to the different technology solutions, how these could affect society now and in the future (through applying scenario planning techniques).
4. We will integrate the knowledge and insights obtained from the above three approaches, to understand how they are interconnected and how they influence one another.

Onderwijsvorm

lectures, guest lectures, werkcolleges, group work, self study

Toetsvorm

written exam
project report
presentation of project report
literature exercise

Doelgroep

mCh-SES, mPhys-SES

Protein Analysis

Vakcode	X_435045 (435045)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Docent(en)	dr. H. Lingeman
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Providing a clear overview on the principles and techniques that can be used for the qualitative and quantitative determination of protein-type of compounds.

Inhoud vak

The qualitative and quantitative determination of protein frequently is performed by a combination of chromatographic /electrophoretic and mass spectrometric techniques. The principles of these techniques will be discussed as well as their applications. Special attention will be given to sample treatment procedures and affinity-based separation techniques. With respect to the identification of unknown biological macromolecules, the power of hyphenated techniques in combination with the various modes

of mass spectrometry will be highlighted.

Onderwijsvorm

Lectures and tutorials

Toetsvorm

Oral examination.

Literatuur

Hand-outs (electronically available).

Vereiste voorkennis

Basic knowledge of biochemistry, separation sciences, spectroscopy and mass spectrometry.

Doelgroep

mCh, mDDS

Protein Science

Vakcode	AM_470145 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. D. Bald
Examinator	dr. D. Bald
Docent(en)	dr. M.H. Siderius, prof. dr. ir. E.J.G. Peterman, dr. J.N.M. Commandeur, dr. D. Bald, prof. dr. M.J. Smit
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

The student:

1. knows and understands principles of protein structure, dynamics, regulation, inhibition, interaction and engineering
2. can explain protein function based on protein structure and the properties of amino acid residues.
3. can predict the function of (parts of) a protein based on understanding of its molecular properties
4. knows and understands the principle of current methods for protein investigation (e.g. overproduction, purification, interaction, engineering)
5. can analyze the strong and weak points of Protein Science techniques and can correlate an open question with a suitable technique.
6. can analyze experiments in Protein Science and design new experiments.

Inhoud vak

We will start with a repetition of protein structure and function. Subsequently, we will focus on methods in protein science and also on more specialized properties of proteins important in fundamental research, biomedicine or biotechnology. Finally we will deal with case studies on selected proteins.

Lecture topics include:

Protein Structure, Protein Function, Protein Dynamics, Molecular Machines, Control of Protein Function, Protein inhibition, Antibiotic action, Development of antibiotics and antibiotic resistance, Protein over-expression and purification, Protein Interaction, Protein Engineering, Molecular Modeling and docking
 Case studies:
 GPCRs as drug target, Cytochrome P450, Chaperones as Protein folding machines,
 Molecular Modeling/docking.

Onderwijsvorm

Lectures (30 h) accompanied by work (paper) discussions (6 h) and self study (individual or in small groups) to prepare for the lectures and to discuss the material presented in lectures/accompanying papers.

Toetsvorm

Written exam

Literatuur

No special book required. Useful may be "Protein Structure and Function" by Petsko/Ringe. You can also use any Biochemistry textbook (e.g. Voet and Voet) for repetition. You will receive material (reviews and original articles on relevant topics). Examples of scientific literature: Lee et al. Nature 2010, Bax et al. Nature 2010, and Kumar Exp. Opin. Drug Metab 2010.

Doelgroep

Masters students Biomolecular Sciences, Biomedical Sciences, Biology, Pharmaceutical Sciences and Medical Natural Sciences

Overige informatie

Visiting lecturer: Dr. Anil Koul, Tibotec J&J

Qualitative and Quantitative Research Methods

Vakcode	AM_470582 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Docent(en)	dr. H. Wels, dr. B.J. Regeer, dr. J.F.H. Kupper
Lesmethode(n)	Hoorcollege, Werkgroep, Computerpracticum
Niveau	400

Doel vak

- Understanding the differences between beta- and gamma research;
- To acquire insight and understanding of a real world research process. This includes knowledge of the character of complex societal issues and the needs, advantages and disadvantages of real world research;
- To acquire insight into various quantitative and qualitative research methods and their underlying theoretical concepts;

- To understand the relative strengths and weaknesses of the various research methods;
- To know how to interpret quantitative and qualitative findings;
- To be able to make an adequate research design for the investigation of a specific complex societal problem.

Inhoud vak

Contemporary societies increasingly face complex social problems, like climate change, HIV/ AIDS or ethnic and religious diversity . These complex problems involve a variety of social actors: policy-makers, professionals, NGOs, industry, science and of course the public at large. Addressing such complex issues demands an approach that investigates, analyzes and integrates the positions and knowledge of different actors. This course offers an (advanced) introduction to various research methods used in real world research: questionnaires, systematic observations using all the senses, surveys and statistics, semi-structured in-depth interviews, as well as focus groups. These methods are commonly used in research into complex problem contexts, communication and opportunities for intervention. Strengths and weaknesses of each research method and technique will be discussed, as well as its possibility to be applied in different societal contexts.

Throughout the course, you will apply theoretical knowledge about the various research methodologies in the training of different qualitative and quantitative methods, and in making a research design. In small groups, you are trained in: (1) qualitative research methods such as semi structured interviews and observation techniques, (2) quantitative research methods such as questionnaires, 3) analysis of the data, and (4) writing a research design.

Onderwijsvorm

Lecture (20h), Training workshops (34h), Research project (107h), Examination (3h).

Toetsvorm

Group assignment (50%) and exam (50%). Both parts need to be graded 6 or higher.

Literatuur

Verschuren, D.E. and Doorewaard, H. (2010). Designing a Research Project (2nd edition)Eleven International Publishing, the Hague. ISBN 978-90-5931-572-3.

Gray, D.E. (2014) Doing Research in the Real World (3rd edition)Sage Publications Ltd, Los Angeles. ISBN 978-1-4462-6019-7

Doelgroep

Compulsory course in the Master programme Management, Policy Analysis and Entrepreneurship for the Health and Life Sciences (MPA) and compulsory course within the Science communication- and Societal differentiations of Health, Life and Natural Sciences Masters programmes.

Overige informatie

Attendance of training workshops is compulsory. For further information please contact Marlous Arentshorst: m.e.arentshorst@vu.nl

Quantum Theory of Molecules and Matter

Vakcode	X_428517 (428517)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

The course description is available on

<http://studiegids.uva.nl/web/uva/sgs/en/c/10910.html>

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Relativistic Quantum Chemistry

Vakcode	X_435113 (435113)
Periode	Periode 4
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. L. Visscher
Examinator	prof. dr. L. Visscher
Docent(en)	prof. dr. L. Visscher
Lesmethode(n)	Hoorcollege
Niveau	500

Doel vak

Relativistic Quantum Chemistry is an advanced master course that discusses relativistic effects in molecules and the techniques used to calculate them.

Inhoud vak

Calculations of chemical and spectroscopic properties of heavy elements need to be based on the relativistic equation of Dirac in order to obtain reliable results. In this course you will learn why relativity influences the chemistry of heavy elements and how modern quantumchemical methods take this into account. The course will start with a short introduction to relativistic quantum mechanics that is followed by an overview of approximations that are used to make calculations computationally feasible. Throughout the course we will discuss consequences of the effects encountered on the chemistry and spectroscopy of (in particular) heavy elements.

Onderwijsvorm

Self study, exercises and computer exercises. Discussion sessions (depending on the number of student who participate).

Toetsvorm

Written exam.

Literatuur

Dyall, K.G. and Faegri, K., Relativistic Quantum Chemistry. Oxford: Oxford University Press, 2007.

Aanbevolen voorkennis

Mastercourse Understanding Quantum Chemistry.

Doelgroep

mCh

Overige informatie

The course is offered in period 4. The precise schedule depends on the number of participating students.

SBI Project & Master Thesis

Vakcode	X_432735 ()
Periode	Ac. Jaar (september)
Credits	36.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. B.A.G. Bossink
Lesmethode(n)	Hoorcollege
Niveau	600

Doel vak

The aim of the Master project is that the individual student learns to conduct a comprehensive SBI research project.

Inhoud vak

Further deepening and application of knowledge and skills that are obtained during the bachelor and master program. The project starts with developing a project plan. The plan consists of: literature study, research questions, research methods and techniques, time schedule and research goals. The project starts when the plan is approved by the supervisors from VU University and the supervisor from the organization in which the student conducts the research project. The research project lasts for four to five months, and is centered around a SBI-related problem that is acknowledged by the student and the supervisors. The student produces two deliverables:

- A thesis, consisting of scientific research design, results, discussion, and conclusions.
- A report describing the organization in which the project is conducted.

Onderwijsvorm

Mandatory classes in December/January.

For further information see Manual Master project SBI (Blackboard). Student will spend most of his/her time on conducting the research project and writing the thesis. Additionally, some time will also be spent on contributing to practical work in the organization that enables the research project.

Toetsvorm

Thesis and oral presentation

Literatuur

Verschuren, P., Doorewaard, H. (most recent edition) Designing a research project. The Hague: Eleven International Publishing.

Vereiste voorkennis

Up-to-date PEP signed by the master coordinator and the examination board. Maximum of 12 EC open, master project excluded, at the start of the internship.

Doelgroep

2 M SBI

Overige informatie

A mandatory part of the Master project is the writing of a reflection report. This reflection consists of two parts: a business analysis and self-reflection. The student has to write the report when the internship is (almost) completed.

Science and Communication

Vakcode	AM_470587 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. B.J. Regeer
Examinator	dr. B.J. Regeer
Docent(en)	dr. B.J. Regeer, dr. J.F.H. Kupper, B.M. Tielemans, P. Klaassen MA
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

- Gain theoretical insight in the relationship between science and society,
- Gain insight in the role of science communication in this relationship,
- Acquire knowledge of different theories and models of science communication,
- Acquire knowledge of different strategies, media and activities for science communication,
- Learn how to apply theoretical concepts to real-life examples,
- Development of practical skills for science communication (e.g. writing, discussing).

Inhoud vak

Science is all around us and shapes our lives in many different ways. From the vaccines you need for travelling abroad, to the technological devices you use on a daily basis. At the same time, society shapes the development of science and technology. Science and society influence each other continuously; they communicate. Students of Science

Communication are expected to become experts in understanding and designing interaction between science and society. In order for this interaction to be fruitful and valuable for both science and society, it is important to gain in-depth knowledge about the theoretical basis of the field of science communication and understand communication processes at the core of several interfaces; e.g. the communication between scientists from different disciplines, between different sciences and their stakeholders, and between science and the public. This course provides a broad basis in the field of science communication by addressing the main areas of science communication and by discussing and challenging several core concepts within this field. Students are invited to explore some issues in greater depth and active participation in lectures and workgroups is required.

Onderwijsvorm

Lectures (22 h)
 Workgroups (18 h)
 Home-study for group assignments (8 h)
 Home-study for individual assignments/exam (90h)

Toetsvorm

Individual assignments (30%), group assignment (10%), examination (60%).
 For all parts a pass grade needs to be obtained.

Literatuur

Academic articles. Direct links to articles will be provided on BlackBoard one month before the beginning of the course.

Doelgroep

The course Science and Communication is a compulsory course for students of the Master specialisation Science Communication (Wetenschapscommunicatie) and is a prerequisite for the internship. Science and Communication is an optional course for students from other master programs in the health and life sciences.

Science and Society in a Hist. Persp.

Vakcode	X_400424 (400424)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. D.J. Beckers
Examinator	dr. D.J. Beckers
Docent(en)	dr. D.J. Beckers
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

To increase understanding of the various interactions between mathematics, chemistry, physics, (medical) biology, computer and earth sciences (in general: science) and society during the last two centuries.

Inhoud vak

In the last two centuries science has become one of the prime agents in the shaping of modern society. In turn social and political concerns have been equally instrumental in the shaping of the modern scientific enterprise. In this course we will study the changing relationship between science and society in this period in various case studies and from several points of view. We will use literature and source material, most notably (journal and film) advertisements, and the cartoon journal Punch to illustrate these cases. The following themes are addressed: professionalization, science and the public (e.g. the public understanding and appreciation of science); Science as product and agent of modernity (e.g. quantification and standardization as applied to nature and society); Science and politics (e.g. science policies, military and commercial interests, science and ideology), science and education.

Onderwijsvorm

seminar.

Toetsvorm

Active participation during the seminar, essay and presentation and a short exam on the topics addressed during the classes.

Literatuur

available via blackboard.

Vereiste voorkennis

introduction history of science

Aanbevolen voorkennis

in possession of a Bachelor degree

Doelgroep

mFEW, mFALW, history

Overige informatie

More information with the course coordinator: Afdeling Algemene Vorming, De Boelelaan 1081, kamer U252, d.j.beckers@vu.nl

Science in Dialogue

Vakcode	AM_1002 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Docent(en)	dr. J.F.H. Kupper
Lesmethode(n)	Werkgroep, Hoorcollege
Niveau	500

Doel vak

To gain knowledge of and insight into:

- the basic concepts and issues in the understanding of science-society

interactions, both from a philosophical and communication science perspective

- the nature and course of interpersonal and group communication processes relevant to the formal and informal dialogue between science and society
- the nature and form of dialogical science communication, aimed at reflective learning and mutual understanding

To acquire or improve:

- individual skills for effective interpersonal communication
- individual skills for the design and facilitation of the science-society dialogue

Inhoud vak

This course examines the public character of scientific controversy and focuses on the communicative aspects of a fruitful science-society dialogue. At the dawn of the 21st century, science, and particularly fields that combine science and engineering such as nanotechnology and synthetic biology, holds a great promise for the progress of our societies. At the same time, these developments are controversial. They lead to a variety of concerns related to risks, benefits and wider moral issues. Nanotechnology creates materials with novel characteristics that help us, but may also contain risks for health and environment. Synthetic biology develops new biological systems that may be very useful, but radically change the nature and meaning of life. Clearly, advances in science do not always match the needs, desires and expectations of society. On the other hand, parts of society might not always appreciate the nature and scope of scientific findings. For a fruitful relationship between science and society, a constructive science-society dialogue is necessary.

This course offers advanced lectures on the basic concepts and issues of dialogical science communication: communication, learning, dialogue, understanding, controversy, democracy. A series of workshops and small group assignments presents communicative tools and spaces such as discussion games, science theatre and multimedia platforms that can be used to design and facilitate science-society interactions. Training workshops will focus on improving the students' individual communication and facilitation skills. The students' individual learning curve as a science communicator and facilitator is self-evaluated by means of a reflection report.

Every course week is completed with a mini-exam.

Onderwijsvorm

Lectures (14h), Workgroups (28h), Training workshops (24h), Selfstudy, (82h), Dialogue presentations (12h)

Toetsvorm

Group assignment (50%), Take home exam (30%), Reflection report (20%). All assignments must be passed (grade > 6).

Literatuur

Is announced on blackboard one month before start of the course

Doelgroep

Optional course in the MSc specialization Science Communication

Overige informatie

Independence and a cooperative attitude is expected. Attendance to training workshops is mandatory.

Science in Perspective

Vakcode	X_437030 ()
Periode	Periode 4+5
Credits	6.0
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

<http://studiegids.uva.nl/web/uva/sgs/nl/c/9061.html>

Doelgroep

mCh, mPhys

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Science Journalism

Vakcode	AM_471014 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Docent(en)	dr. J.F.H. Kupper, W.J. Breukers MSc, dr. M.J.W. Bos
Lesmethode(n)	Hoorcollege, Werkgroep, Computerpracticum
Niveau	500

Doel vak

To acquire knowledge of and insight into:

- the concepts, models and issues of science journalism according to contemporary scientific literature
- the criteria for effective science journalism with respect to diverse media
- the representation of science in the media
- the role of science journalism in the use of scientific knowledge in society

To acquire skills in:

- writing popular scientific texts for different genres such as news, background and interview
- designing science communication for different media such as newspaper, radio and internet

Orientation to the professional practice of science journalism

Inhoud vak

This course teaches the basic principles of science journalism. A series of interactive lectures reviews both the practical as well as the

theoretical aspects of science journalism. Topics that are discussed are the translation of science to a language that is both compelling and understandable, the role of journalism in the interaction between science and society, images of science in the media and the ethics of science journalism. The interactive lectures invite you to take your own defensible position with regard to these issues.

Guest lectures provide insight into the professional practice of science journalists. The guest speakers work as freelancer, editor or producer at diverse science media, such as newspapers (NRC, Volkskrant), magazines (NWT), internet (Noorderlicht) and radio (Labyrint).

Finally, the course trains specific skills that you need as a science journalist, such as popular writing, interviewing, conceptual analysis and program design.

Onderwijsvorm

Lectures and seminars on theory and practice of science journalism and writing skill training (36h). Considerable time is set aside for performing science journalism in assignments (108h). The assignments are assessed by lecturers and fellow students (peer-review process). Self study (16h).

Toetsvorm

Several individual assignments (60%), several small group assignments (40%). All assignments must be passed (grade > 6).

Literatuur

Announced on Blackboard one month before start of the course

Doelgroep

All Master students with a Beta-Bachelor degree. Students taking this course as part of their C-specialisation within FALW or FEW will have precedence over other students. Students from other faculties and or universities need to get formal consent from the course coördinator (Frank Kupper) before enrolment.

Overige informatie

Course is taught in Dutch. More information: f.kupper@vu.nl.

Science Museology

Vakcode	AM_470590 ()
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. B.J. Regeer
Examinator	dr. B.J. Regeer
Docent(en)	dr. B.J. Regeer, drs. ir. M.G. van der Meij
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	500

Doel vak

- Gain insight in the role of museum exhibits in the field of science communication.
- Gain insight in the role of science communication concepts in the

context of science museums.

- Apply qualitative research methods to design, conduct, and report on a user research project in museum settings.
- Apply theoretical notions of science communication and exhibit design to advise on adjustments and/or development of exhibitions.
- Gain experience in working for an external commissioner.

Inhoud vak

This course is about the role of science museums/centers, zoos and natural history museums in science communication. You will get familiar with theories of science communication in museum settings, and will be introduced to different styles of communication, different approaches to exhibit design & development, and different methods of research and evaluation of exhibitions.

Guest speakers and lecturers give insight into their profession (1) as science communicators in museums and science centers, (2) as researchers in the field of museology, and/or (3) as professionals in informal science & technology learning environments.

Through individual and group assignments you are encouraged to combine theory and practice, working step-by-step towards (part of) an exhibition (re-)design. The group assignments are commissioned by museums and science centers, such as NEMO, Museon, Naturalis, Delft Science Centre, and Artis.

Onderwijsvorm

Lectures (14 h)

Workgroups (40 h)

Home-study for group assignments (64 h)

Home-study for individual assignments (32 h)

Toetsvorm

Group assignment (40%), presentations (poster and oral) (10%), and exams (take-home and written) (50%). For the assignments, presentations and all exams a pass-grade must be obtained.

Literatuur

Academic articles. Direct links to articles will be provided on Blackboard one month before the beginning of the course.

Vereiste voorkennis

Bachelor in any of the Beta Sciences

Doelgroep

Optional course in the C-differentiations (Science Communication) of most of the two-year master programs of the FALW and FEW faculties.

Master students from other universities in any scientific field are welcome as well.

Overige informatie

Guest lectures from and excursions to for instance Artis, NEMO, Naturalis, NorthernLight, Museon, etc.

Science project

Vakcode	X_422591 ()
Periode	Ac. Jaar (september)
Credits	24.0

Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. J.P. Dekker
Examinator	dr. J.P. Dekker
Niveau	400

Doel vak

The MSc SBI students will follow the Science Project SBI to strengthen their knowledge and experience with natural sciences in order to be able to talk the language of the specialists and to scan and interpret new developments and inventions in the field of life and health and/or energy and sustainability. The student will:

- a. actively participate in a research team and is expected to critically follow and discuss research matters that are a subject in meetings as well as present his or her own work to the group on a regular basis. In doing so and through this immersion in faculty research, the student is becoming acquainted with a research process, including its organization, objectives and challenges.
- b. design, execute and deliver his or her own research project and be individually responsible for it, under supervision of a senior scientist. A second and independent reviewer will be assigned to assess the final products.
- c. deliver a final report, present outcomes on a regular basis including a final presentation and make detailed recommendations for further research with respect to his or her research assignment.

Inhoud vak

In this project the student should work closely with laboratory researchers on a project based on modeling and/or experimental lab work. Programs that contain innovation or valorization aspects are ideally suited for participation of SBI students. Once a topic has been agreed upon, the student will agree on a research question. Subsequently the student will draft a research plan in which is addressed: theoretical framework, research methodology and data analysis, experimentation set-up, planning, organization, anticipated outcomes and reporting format. This plan will also include a listing of some relevant literature references pertaining to the particular topic.

The plan may also include a course to provide insight and experience on experimental lab work or modeling. For instance, it is possible to define a drug discovery project that is accompanied by the integrated course Computational Design and Synthesis of Drugs (code 435673). In this course, students will learn step by step about data mining and computer-aided drug design techniques. In other cases it is possible to acquire experimental skills with experiments offered in the courses Natuurkunde Practicum 3 (code 420532) or Practicum Natuurkunde en Informatica (code 420555). In all cases, however, the study load of these courses will be integrated in the Science Project SBI.

Onderwijsvorm

Research project

Toetsvorm

Report and presentation, as explained in the course manual

Literatuur

Depending on the project

Vereiste voorkennis

Requirements to enter the mSBI program

Doelgroep

mSBI

Scientific Computing and Programming

Vakcode	X_435076 (435076)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. L. Visscher
Examinator	prof. dr. L. Visscher
Docent(en)	prof. dr. L. Visscher
Lesmethode(n)	Hoorcollege, Practicum
Niveau	500

Doel vak

To instill a broad understanding of how computers are utilized in scientific research, and impart practical skills in scientific programming and scripting.

Inhoud vak

This course is a collaborative effort involving the VU, UvA and UL. It includes a total of six modules of which a minimum of four need to be chosen.

The 'Introduction to Unix/Linux Systems' is compulsory, as is either 'Scientific Software Development in Fortran' or 'Introduction to C Programming'.

The modules 'Introduction to Unix/Linux Systems' and 'Introduction to C Programming' are given at the UvA, while the modules 'Scientific Scripting with Python' and 'Scientific Software Development in Fortran' are given at the VU University. The optional courses 'High-Performance Computing' and 'A Crash Course in Basic Numerical Methods' are held in Leiden (UL).

The full list of modules is as follows:

1) Introduction to Unix/Linux Systems

Includes logging in; directories and files; grep and regular expressions; editing with vi; sed and awk; shells and shell programming.

2) Scientific Software Development in Fortran

Includes flavors of Fortran; compiling; variables and data types; procedures; reading/writing data; arrays; control statements; modules; user-defined types; structured programming with abstract data types (ADTs); introduction to concepts in software design.

3) Introduction to C Programming

Includes compiling with gcc; variables; control structures (e.g. loops); data types and functions; input/output; pointers; basic

algorithms.

4) Scientific Scripting with Python

Includes introduction to scripting and automation; introduction to Python; running scripts; loading modules; variables; functions; opening/closing files; reading data; extracting data from strings; writing data; running external programs; working with structured data (eg XML, SQL databases); classes and object-oriented programming.

5) High-Performance Computing

Includes introduction to High-Performance Computing (HPC) systems; use of batch systems and queue managers; C/C++ and fortran compilers; introduction to computer architecture; introduction to parallelization with MPI and OpenMP.

6) A Crash Course in Basic Numerical Methods

Includes introduction to numerical techniques; floating-point numbers; finite-difference algorithms for differentiation; numerical integration; interpolation; data fitting.

Onderwijsvorm

Lectures, exercise sessions and self study.

Toetsvorm

Each module will be assessed separately.

Assessment requires completion of assignments for each module taken.

Literatuur

Course notes will be provided. Some online resources will be used.

Aanbevolen voorkennis

None.

Doelgroep

Master students that would like to automate the generation and/or processing of scientific data. This need not be restricted to students in theoretical fields: experimentalists can also benefit from computing skills, especially for the analysis and processing of experimental data.

Scientific Writing in English

Vakcode	X_400592 (400592)
Periode	Periode 2, Periode 6
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	M. van den Hoorn
Examinator	M. van den Hoorn
Lesmethode(n)	Hoorcollege, Werkcollege
Niveau	400

Doel vak

The aim of this course is to provide the writing student with the essential linguistic means for producing English academic texts which are effective, idiomatically and stylistically appropriate and

grammatically correct.

Inhoud vak

The initial focus in the course lies on the form of scientific texts in the Exact Sciences:

- Abstract (or summary)
- Introduction
- Methods
- Results
- Discussion

General course outline

Introducing the topics

- Academic and technical writing in English
- The characteristics of different kinds of scientific texts
- How scientific writing is judged and assessed
- Where do you find your information and how do you present it?
- How to avoid committing plagiarism

Who am I writing for? What do I want to say?

- Your readership
- Key parts of an academic article: title, abstract, introduction, methods, results and discussion

Writing the actual article

- Paragraph and sentence construction: how do I link paragraphs together?
- Writing simple and complex sentences. Active and passive sentences.
- Argumentation : how do I put an argument? How do I frame my own opinion?

Should I use "I" or "we"?

Writing correct English

- Use of apostrophes and colons
- Word order, verb tenses, time and tense
- Avoiding mistakes typically made by Dutch writers
- Common spelling mistakes

You will be making considerable use of peer assessment: examining fellow students' written work and giving them feedback. This method provides useful insights into how a text might be improved. The process of providing someone else with feedback on their text is something that you will find very instructive.

Onderwijsvorm

The course is focused on self-tuition. The plenary sessions concentrate on the process of writing and the product of writing. Homework is part of the course. With each topic, participants work through a phased series of exercises that usually conclude with the requirement to write a short piece of text. The instructor will append extensive written remarks to this text.

Toetsvorm

There will be no examination. However, students will receive their credits only when they have participated in all classes (presence is obligatory) and also when they have handed in the assignments satisfactorily. Students will receive a 'pass' when they have finished the course.

Literatuur

For this course you need the book *Effective Scientific Writing: an advanced learner's guide to better English* (A. Bolt & W. Bruins, ISBN

978 90 8659 6171). This book can be obtained at the VU bookstore, which is located in the VU main building. The costs are € 27,95 per book. For questions contact the Taalcentrum-VU at 020 - 598 9804.

Vereiste voorkennis

Bachelor Exact Sciences

Doelgroep

Optional for mAI, mCS, mIS, mBIO, mPDCS, mCh, mDDS, mPhys.

Separation Sciences

Vakcode	X_435609 (435609)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Docent(en)	dr. H. Lingeman
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

Getting acquainted with the theory and practice of the main techniques in modern analytical separation science.

Inhoud vak

The topics discussed comprise the fundamentals, theory and practice of gas chromatography, the various modes of liquid chromatography, capillary-based electrophoretic approaches as well as the hyphenation of the various separation systems with mass spectrometry and other sensitive and selective detection devices.

Onderwijsvorm

Lectures and tutorials. Students have to summarize and present an (assigned) recent article on separation science.

Toetsvorm

Written examination and a mark for the article presentation.

Literatuur

Hands-outs (electronically available).

Vereiste voorkennis

Basic knowledge of biochemistry, chromatography, electrophoresis and mass spectrometry.

Aanbevolen voorkennis

Basic knowledge of biochemistry, chromatography, electrophoresis and mass spectrometry.

Doelgroep

mCh-AS

Solid State NMR

Vakcode	X_432809 ()
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Doel vak

voor informatie neem contact op met Prof. Lies Bouwman@lic.leidenuniv.nl

Inhoud vak

https://studiegids.leidenuniv.nl/courses/show/44380/solid_state_nmr

Statistical Theory of Complex Molecular Systems

Vakcode	X_428520 (428520)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

The course description is available on

<http://studiegids.uva.nl/web/uva/sgs/nl/c/10917.html>

Doelgroep

mMNS-PoL, mPhys-LSBP, mPhys-PLH, mCh-MSP

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Structures & properties of organic molecules

Vakcode	X_432842 ()
Periode	Periode 1+2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. H. Lingeman
Examinator	dr. H. Lingeman
Lesmethode(n)	Hoorcollege
Niveau	400

Supramolecular Chemistry and Nanomaterials

Vakcode	X_435653 (435653)
Periode	Periode 1
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/en/c/211.html>

Doelgroep

mCh-MDSC, mCh-MSP, mDDS-CMCT, mDDS-DDSA, mDDS-DDTF

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Survival Guide for Scientists

Vakcode	X_428523 (428523)
Periode	Periode 6
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Inhoud vak

The course description is; available on
<http://studiegids.uva.nl/web/uva/sgs/en/c/11058.html>

Doelgroep

mPhys, mCH

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Synthetic Organic Chemistry

Vakcode	X_435665 (435665)
Periode	Periode 4
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen

Niveau	500
---------------	-----

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/en/c/207.html>

Doelgroep

mCh-MDSC

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Teaching Assistant

Vakcode	X_432741 ()
Periode	Ac. Jaar (september)
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Teaching Assistant

Vakcode	X_432742 ()
Periode	Ac. Jaar (september)
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Technology and Innovation Processes

Vakcode	E_BA_TIP ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Fac. der Economische Wet. en Bedrijfsk.
Coördinator	dr. ir. J.J. Berends
Examinator	dr. ir. J.J. Berends
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	400

Doel vak

After finishing this course, students will be able to:

- explain challenges, concepts, and theories with regard to processes of technological innovation
- apply concepts and theories to analyze real life cases and develop solutions to improve innovation processes
- critically reflect upon theoretical assumptions and methodological approaches in research on technology and innovation

Inhoud vak

This course is about processes of technological innovation in and between organizations. In short, this course concerns the creation of innovative ideas and their conversion into products and services that have value for a company and its customers. This course helps students to understand and improve the complex and uncertain process of technological innovation. Topics that will be addressed include the evolution of technology, collaborative innovation, uncertainty and learning, business model innovation, the role of the institutional context, and timing in innovation processes. The course will focus on specific fields of technology: energy, information technology, life sciences / biotech, and semiconductors.

Onderwijsvorm

The course will consist of a combination of interactive lectures (6), seminars (6), and assignments. The lectures will also include a critical discussion of selected readings, stimulated by obligatory individual reflections on this literature. The seminars will be used to have groups of students present and discuss assignments.

Toetsvorm

Students will be graded based upon three types of assignments:

- Individual reflections on literature
- Group assignments based upon real life cases
- Final group assignment in which theoretical perspectives have to be applied to a specific technological innovation.

Literatuur

A collection of scientific articles, to be announced through Blackboard.

Aanbevolen voorkennis

Basic knowledge of innovation management and organization studies

The analytical Chemist in Industry

Vakcode	X_437005 (437005)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. ir. R.V.A. Orru
Examinator	prof. dr. ir. R.V.A. Orru
Niveau	400

Inhoud vak

The course description is available at
<http://studiegids.uva.nl/web/uva/sgs/en/c/218.html>

Doelgroep

mCh

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Thermodynamica

Vakcode	X_430600 ()
Periode	Periode 1, Periode 2+3
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

<http://studiegids.uva.nl/xmlpages/page/2014-2015/zoek-vak/vak/12646>

Overige informatie

Registration via <https://www.sis.uva.nl> is mandatory 4 weeks before the start of the Semester.

Transdisciplinarity and Transition

Vakcode	X_430604 ()
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. J.T. de Cock Buning
Docent(en)	prof. dr. J.T. de Cock Buning
Lesmethode(n)	Hoorcollege, Werkcollege, Deeltoets extra zaalcapaciteit
Niveau	400

Doel vak

- You can reproduce the essence of the current transition theories, e.g., Multi level perspective theories.
- You can design a tailor made transdisciplinary approach to identify and cope with hurdles in an innovation trajectory, e.g., Interactive Learning and Action approach,
- You are able to make an in-depth semi-structured interview guide.
- You are able to execute and transcribe/analyze/summarize an interview
- You are able to apply analytical tools (causal analysis, actor analysis, fact-value framing), SWOT.

- You are able to integrate multidisciplinary knowledge and multi-stakeholder interests into a management advice for a transition processes

Inhoud vak

Innovation often implies a troublesome and risky process starting with a bright idea, via a small niche innovation towards a competitive position. This course will focus on the analytical skills necessary to guide or advice a niche innovation.

Guiding and advising implies that you are aware of the social forces prohibiting a breakthrough and how to identify tailor made solutions to deal with these forces. Therefore, this course introduces you into the current theories related to innovation and societal forces, the so called multilevel theories, and we will offer you training with a toolbox of various analytical methods to explore the specific hurdles of a given project, in order to design a tailor made advice.

Little by little academic research reveals the complexity of societal mechanisms behind transitions, e.g., cultural aspects, psychological aspects, structures of states, institutions and multinationals.

Transdisciplinarity is an emerging discipline in which research approaches and analytical methods are developed to connect relevant parts of different disciplines to solve complex processes such as transitions. Complex because: there are different stakeholders involved from industry, academia, consumers and NGO's, and within academia there are beta disciplines and gamma disciplines involved who do not share a same vocabulary and methodologies, nor visions what is "best" for society.

On the base with our in house experiences with large innovative consortia (Genomic Initiative/ ecological genomics, Sustainable innovation/brain imaging, Be-basic/synthetic biology) you will learn all about the do's and don'ts of Interactive learning approach, actor analysis to delineate you allies and enemies, the semi-structured interviews to deepen your understanding of reasons for problems to meet, causal analysis to understand the complexity of the problems you face, and SWOT analysis to arrive at strategic priorities.

Parallel to the lectures you will work with a team on an advice regarding an innovation, scheduling interviews with key players and analyze the complexity of interests.

Onderwijsvorm

The total study time is 6 EC(6x28 = 168 hours). Tuition methods include lectures, self-study, response lectures and per team on a different case study as project. In the case study, you'll practice integrating theories and tools, and applying the toolbox.

- lectures 12 hours
- coach meetings 16 hours
- skills training 6 hours
- execution of 2 interviews 2 hours
- execution expert meeting 2 hours
- presentation of project results 4 hours
- self study and project 124 hours
- examination 2 hours (Four mini-exams of 30 minutes)

Please note that attendance to the project meetings is compulsory. For the group project, you will make rules with your group during the first

meeting with your coach.

Toetsvorm

The course grade is based on the project (group and individual) and the exam. All aspects have to be concluded with the grade of 5.5 or higher.

Team project report (40%)

Team project presentation (10%)

Attitude and skills assessment (20%)

Exam (30%)

Literatuur

Book: Biotechnology and Food (sold at the start)

Vereiste voorkennis

Proven knowledge of organizations and management and business is required

Doelgroep

master students SBI track (mCh)

Intekenprocedure

As the number of participants will dictate the number of different projects (and the related team coaches), the deadline for VU-net registration will be 4 weeks before the start of the course. Retracting your registration for the course after the deadline will have detrimental effects on the composition of the teams, the network of contacted interviewees and contracted coaches.

Overige informatie

This course mimics the world of a transition task-force. This implies 100% use of the available time (=20 hours a week) to accomplish all the necessary steps in conceptualization of the complexity, data collection, interviews, analysis, validation of pre-liminary result with external experts, and finally presenting your change strategy. You will need to use and integrate all you learned before.

Transport Phenomena

Vakcode	X_420075 (420075)
Periode	Periode 4+5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	500

Inhoud vak

The course description is available on

<http://studiegids.uva.nl/web/uva/sgs/en/c/221.html>

Doelgroep

mCh-MSP

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Tutoring Students

Vakcode	X_432625 (432625)
Periode	Periode 2
Credits	3.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	dr. M. Wijtmans
Examinator	dr. M. Wijtmans
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

This course aims to prepare students for coaching tasks in tutorials and practical courses. Students will encounter aspects of teacher-student interaction, including several models that are involved in the coaching process.

Inhoud vak

The course contains various topics and activities. Students make an analysis of various learning aims as well as prepare, conduct and reflect on a presentation of a pre and post discussion regarding tutorials and practical courses. They will observe and interpret the application of problem solving and coaching models in tutorials and practical courses. Attention will be paid to strengths and weaknesses in models of teacher-student interaction. An important constituent is the student's analysis of his/her own pattern of communication. Topics on safety and lab journal procedures in practical courses as well as on the grading of lab reports are also included.

Onderwijsvorm

4 consecutive hours per week (seven weeks long):

- Lectures
- Simulations
- Self-study
- Group work

Toetsvorm

- An essay on the strengths and weaknesses in a model of teacher-student interaction.
- A learning report on presentations concerning predict, observe, explain in practical work.
- A written analysis on grading lab reports.
- A written feedback on the planning of and enactment in tutorials.

Literatuur

Will be provided.

Doelgroep

mCh-AS, mCh-MDSC, mCh-MSP, mCh-SES, mDDS-BCCA, mDDS-CMCT, mDDS-DD&S, mDDS-DDSA, mDDS-DDTF

Intekenprocedure

Overige informatie

This course is compulsory for MSc students who become assistants in practical courses and tutorials in the department of Chemistry and Pharmaceutical Sciences. Moreover, the course is recommendable to any MSc student who has a general interest in educational coaching strategies and models.

Number of participants is limited to 24 (first-come, first-serve basis).

Priority is given to MSc students. If any of the 24 seats are left, the course may also be accessible to 3rd year BSc students FAR en SK with a strong interest in educational aspects (first-come, first-serve basis).

Interested BSc students should first contact Maikel Wijtmans (m.wijtmans@vu.nl).

Ultrafast Laser Physics

Vakcode	X_422556 (422556)
Periode	Periode 5
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. K.S.E. Eikema
Examinator	prof. dr. K.S.E. Eikema
Docent(en)	prof. dr. K.S.E. Eikema
Lesmethode(n)	Hoorcollege
Niveau	400

Doel vak

To provide a broad overview of both the ultrafast techniques and phenomena in physics and chemistry.

Inhoud vak

This course covers both the principles behind ultrafast optical pulse generation and control, and its applications in physics and chemistry. After a review of basic femtosecond laser techniques, the interaction of light with matter in the linear and nonlinear regime will be discussed. This includes the concepts of dispersion (in 1st and higher order) and pulse propagation effects, nonlinear processes such as second-harmonic generation, parametric amplification, stimulated Raman scattering, photon echos. Also pump-probe and transient spectroscopy will be discussed. Other topics that will be covered are pulse measurement techniques such as FROG and SPIDER, femtosecond frequency combs, spectrum extension methods such as continuum, THz and X-ray generation, attosecond physics, spectral and temporal shaping of pulses, including applications such as coherent control. These concepts will be illustrated using applications in physics and chemistry.

Onderwijsvorm

Lectures with excersices and demonstrations (excursions to the lab).

Toetsvorm

Written exam.

Literatuur

Lecture notes and papers.

Recommended book: "Ultrashort Laser Pulse Phenomena" by J-C Diels and W. Rudolph, 2nd edition (2005), ISBN 978-0-12-215493-5

Aanbevolen voorkennis

Some background in optics and electrodynamics is required.

Doelgroep

Master students physics.

Understanding Molecular Simulation

Vakcode	X_432703 (432703)
Periode	Periode 3
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

The course description is available on

<http://studiegids.uva.nl/web/uva/sgs/en/c/11006.html>

Doelgroep

mPhys-AMEP, mPhys-LSBP, mCh-MSP

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Understanding Quantum Chemistry

Vakcode	X_422557 (422557)
Periode	Periode 2
Credits	6.0
Voertaal	Engels
Faculteit	Faculteit der Exacte Wetenschappen
Coördinator	prof. dr. L. Visscher
Examinator	prof. dr. L. Visscher
Docent(en)	prof. dr. L. Visscher
Lesmethode(n)	Hoorcollege, Practicum
Niveau	400

Doel vak

Introduce the electronic structure methods commonly employed in computational chemistry and physics.

Inhoud vak

The course starts with the introduction of the independent particle model and the consequences of the Pauli principle. The Hartree-Fock approach is introduced and the Slater-Condon rules are derived to treat multideterminant wave functions. This forms the basis for discussion of the more sophisticated wave functions used in Configuration Interaction, Møller-Plesset perturbation theory and Coupled Cluster expansions. The alternative way to deal with electron correlation, Density Functional Theory, is subsequently discussed in detail. These methods are combined and applied in a short project in which the students learn to apply modern electronic structure software. The projects focus either on the calculation of molecular properties, or on the calculation of molecular reactivity. Interpretation of results in a qualitative MO model and assessment of the reliability of calculations forms an integral part of these projects.

Onderwijsvorm

The course comprises sessions of lecture-exercises-lecture that are scheduled twice a week. These sessions serve to cover the theory that is to be mastered by all students. In the remaining sessions students will work on the short projects during which the theory is applied to an actual research problem.

Toetsvorm

Written exam and project report.

Literatuur

Atkins and Friedman, Molecular Quantum Mechanics 4th ed. or later, Oxford University Press.
Jensen, F., Introduction to Computational Chemistry 2nd ed. or later Wiley, 2007.
Hand-outs.

Doelgroep

mPhys-LSBP, mCh-MSP

Overige informatie

Optional course (2 out of 4 choice) in the Master of Chemistry / Molecular Simulation and Photonics track.

Vakdidactiek Scheikunde I

Vakcode	O_MLVDSKI ()
Periode	Periode 1+2, Periode 4+5
Credits	3.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek
Coördinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Docent(en)	dr. H.B. Westbroek, dr. E. van den Berg, F.L. de Vries MSc
Lesmethode(n)	Werkcollege
Niveau	500

Doel vak

De student maakt kennis met de inhoud en didactiek van het schoolvak en leert deze inzichten in de praktijk vorm te geven.

Inhoud vak

De colleges van vakdidactiek I bieden een inleiding in het schoolvak en de lesmethoden, met aandacht voor lesplan en toetsing. Er is ook aandacht voor vakspecifieke kennis en vaardigheden en de voor het schoolvak relevante ICT-toepassingen. In het vakdidactiekprogramma vindt eveneens een vertaling plaats van algemeen didactische thema's naar het vak. De leservaringen op school spelen hierbij een belangrijke rol.

Onderwijsvorm

Interactieve hoor- en werkcolleges

Toetsvorm

Beoordeling op basis van ingeleverde portfolio-opdrachten

Literatuur

Een syllabus wordt op het eerste college uitgereikt

Vereiste voorkennis

Dit vak is alleen te volgen als onderdeel van de universitaire lerarenopleiding

Overige informatie

Er geldt een aanwezigheidsplicht

Vakdidactiek Scheikunde II

Vakcode	O_MLVDSKII ()
Periode	Periode 1+2, Periode 4+5
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek
Coördinator	dr. H.B. Westbroek
Examinator	dr. H.B. Westbroek
Docent(en)	dr. H.B. Westbroek, dr. E. van den Berg, F.L. de Vries MSc
Lesmethode(n)	Werkcollege
Niveau	500

Doel vak

De student kan vakinhoudelijke en vakdidactische kennis, vaardigheden en inzichten vertalen naar de eigen vaklessen.

Inhoud vak

De colleges van vakdidactiek II bieden een voortzetting van de schoolvakspecifieke vakdidactiek. De belangrijkste opdracht is het ontwerp en de uitvoering van een lessenserie van 3 lessen, die inhoudelijk en vakdidactisch verantwoord moet worden.

Onderwijsvorm

Interactieve hoor- en werkcolleges

Toetsvorm

Beoordeling op basis van ingeleverde portfolio-opdrachten

Literatuur

Een syllabus wordt op het eerste college uitgereikt

Vereiste voorkennis

Vakdidactiek I, Algemene didactiek en pedagogiek I, Praktijk I

Overige informatie

Er geldt een aanwezigheidsplicht

Verdieping

Vakcode	O_MLVERD ()
Periode	Periode 2+3, Periode 5+6
Credits	3.0
Voertaal	Nederlands
Faculteit	Faculteit der Psychologie en Pedagogiek
Docent(en)	drs. J.K.W. Riksen, drs. H.R. Goudsmit, drs. Y.G. Meindersma, drs. W.S. Hoekstra, drs. S. Donszelmann, dr. H.B. Westbroek, dr. E. van den Berg, C.L. Geraedts, drs. A. Krijgsman, dr. J.J.M. van Eersel, drs. K.L. Schaap, W. Maas, drs. G.D. van Hummel, F.L. de Vries MSc, drs. H. Stouthart, drs. I. Pauw, drs. C.D.P. van Oeveren
Lesmethode(n)	Werkcollege,
Niveau	500

Doel vak

1. De student verdiept zich in een onderdeel binnen zijn of haar schoolvak of cluster.
2. De student is zich bewust van zijn of haar rol als docent in een pluriforme samenleving.
3. De student kan verschillende aspecten van diversiteit in het onderwijs benoemen en aangeven in hoeverre deze aspecten in zijn of haar eigen schoolvak een rol spelen.

Inhoud vak

Binnen de clusters en vakken worden (verplichte) verdiepingsmodulen aangeboden. Daarnaast volgt elke student het onderdeel diversiteit, waarin een aantal aspecten van onderwijs in een pluriforme samenleving aan bod komen:

1. Wat betekent identiteitsontwikkeling in een door diversiteit gekenmerkte samenleving?
2. Wat is de zin en onzin van diversiteitsgevoelig onderwijs?
3. Wat zijn de verschillende thematieken van diversiteit in de klas?
4. Wat is er bekend uit onderzoek over diversiteit in de onderwijspraktijk?

Onderwijsvorm

Hoorcollege, werkcollege.

Toetsvorm

Analyse van een casus.

Literatuur

Syllabus met artikelen wordt verstrekt.

Wetenschapscommunicatie voor Bèta-onderzoekers

Vakcode	AB_470185 ()
Periode	Periode 5
Credits	6.0
Voertaal	Nederlands
Faculteit	Fac. der Aard- en Levenswetenschappen
Coördinator	dr. J.F.H. Kupper
Examinator	dr. J.F.H. Kupper
Docent(en)	dr. B.J. Regeer, dr. J.F.H. Kupper, C.A.C.M. Pittens MSc, drs. ir. M.G. van der Meij, R.C. van Koten MSc
Lesmethode(n)	Hoorcollege, Werkgroep
Niveau	200

Doel vak

- Introductie in het vakgebied wetenschapscommunicatie
- Verwerven van kennis en inzicht in de dynamische relatie tussen wetenschap en maatschappij
- Verwerven van inzicht in verschillende belangen en perspectieven van betrokken partijen in wetenschapscommunicatie
- Verwerven van inzicht in de rol van wetenschapscommunicatie in de relatie tussen wetenschap en maatschappij
- Verwerven van inzicht in communicatiestrategieën, doelgroepen en media in wetenschapscommunicatie
- Ontwikkeling van praktische vaardigheden voor wetenschapscommunicatie (schrijven, presenteren, discussiëren)
- Het opdoen van ervaring in een multidisciplinaire groep.

Inhoud vak

Wetenschap heeft verstrekkende gevolgen voor de maatschappij (bv. biotechnologie, neurowetenschappen, farmaceutische industrie). Maar hoe kijkt de maatschappij eigenlijk naar wetenschappelijke ontwikkelingen? Wat vindt de industrie van nieuwe wetenschappelijke inzichten? Hoe reageren maatschappelijke organisaties of het brede publiek? Deze maatschappelijke visies hebben een grote invloed op de richting die het onderzoek in de nabije toekomst gaat nemen. Daarom is communicatie over wetenschap van cruciaal belang.

In deze cursus raak je vertrouwt met een aantal modellen van wetenschapscommunicatie, het herkennen van hun toepassingen in de praktijk en de verschillende soorten publiek die men ermee kan aanspreken (populariseren voor leken, informatieoverdracht voor de industrie, faciliteren van interdisciplinair onderzoek in de wetenschap, participatie van burgers en patiënten in onderzoek). Door middel van opdrachten raak je bekend met de praktische kant van wetenschapscommunicatie, bijvoorbeeld wetenschapsjournalistiek, voorlichting, dialogen en debatten, etc. De opdrachten worden deels

individueel uitgevoerd en deels in een groep.

Onderwijsvorm

Colleges 15 uur
Zelfstudie en tentamen 70 uur
Werkcolleges 15 uur
Opdrachten 60 uur

Toetsvorm

Individuele toetsing bestaat uit:

- Schriftelijk tentamen (50%)
- groepsopdrachten (25%)
- individuele opdrachten (25%)

Alle onderdelen moeten met een voldoende worden afgesloten.

Literatuur

Literatuur wordt aangeboden via Blackboard en een maand voor de cursus bekendgemaakt.

Doelgroep

Keuzecursus voor tweedejaars en derdejaars BSc Biomedische Wetenschappen en Biologie en BSc. Gezondheid en Leven. Ook te volgen voor de Bsc binnen Aardwetenschappen en Exacte Wetenschappen. Speciaal aanbevolen voor studenten die overwegen de C-variant (wetenschapscommunicatie) of M-variant (beleid en management) in hun masterprogramma op te nemen.

Overige informatie

We werken met enkele gastsprekers die een maand voor de cursus bekend zullen zijn.

Wiskunde voor HLO-instroom

Vakcode	X_432806 ()
Periode	Periode 1+2
Credits	6.0
Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Doel vak

<http://studiegids.uva.nl/web/uva/sgs/nl/c/12647.html>

Doelgroep

HLO instroom mCH-AS

Overige informatie

Course registration at the UVA is compulsory at least 4 weeks before the start of the semester via <https://www.sis.uva.nl>

Wiskunde voor HLO-instroom

Vakcode	X_430560 ()
Periode	Periode 2+3
Credits	3.0

Voertaal	Nederlands
Faculteit	Faculteit der Exacte Wetenschappen
Niveau	400

Inhoud vak

Studenten sluiten aan bij het vak Wiskunde en Natuurkunde voor chemici

1:

<http://studiegids.uva.nl/web/uva/sgs/nl/c/10369.html>

Doelgroep

HLO-instroom mCh-MDSC

Overige informatie

Opgave via <https://www.sis.uva.nl> tot 4 weken voor aanvang van het semester is verplicht